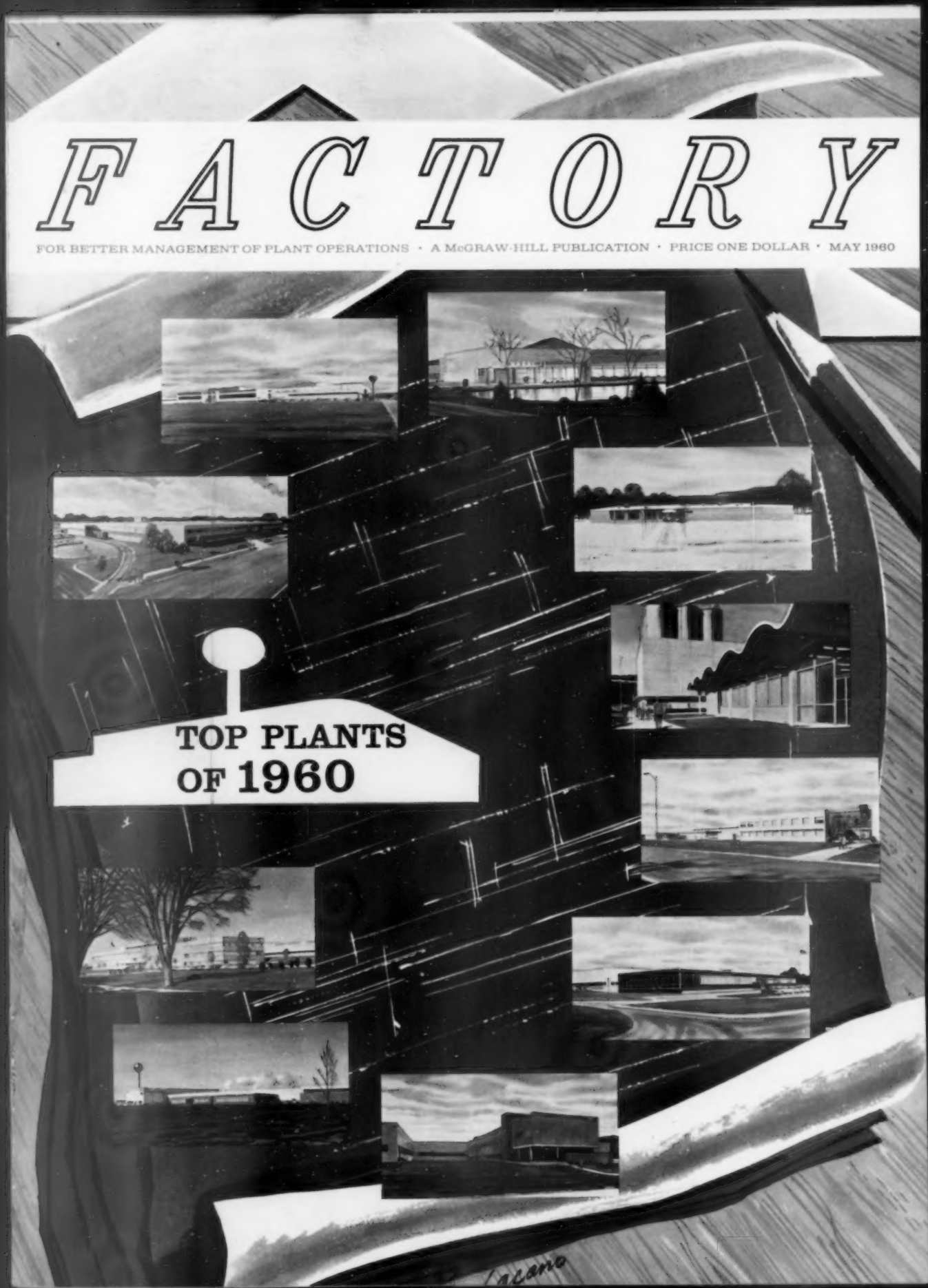
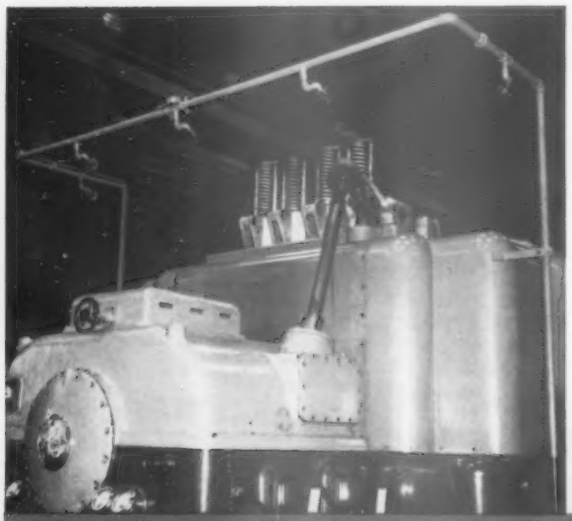
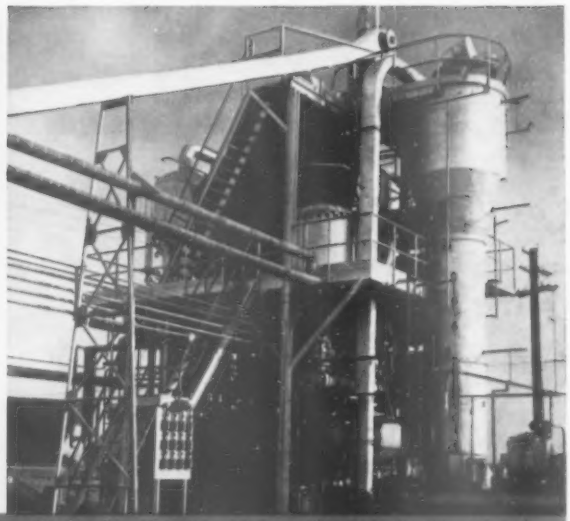
FACTORY

FOR BETTER MANAGEMENT OF PLANT OPERATIONS · A McGRAW-HILL PUBLICATION · PRICE ONE DOLLAR · MAY 1960





At Pennsylvania Power and Light Company, Sunbury, Pa., this steam generator is protected by an automatic Grinnell Protecto-Spray system in the event of outside fires and by a Dry Chemical system inside the casing.



At Canadian Vegetable Oil Processing Ltd., Hamilton, Ontario, Grinnell ProtectoSpray safeguards upper structure of this hexane solvent extraction unit, while a ProtectoFoam system guards the lower section.

At the RCAF supply depot at Namao, Alberta, this infrared drying oven is protected by a Dry Chemical system engineered by Grinnell to protect against possible fire resulting from ignition of flammable vapor mixtures.

At Dresser Industries, Inc., Dallas, Texas, hot metal temporarily ignites resulting vapors as metal is being submerged. If fire should get out of control, a Grinnell-installed Carbon Dioxide system is on guard to extinguish it quickly.

You can rely on Grinnell for the right protection against destruction by fire!

Grinnell has had 90 years experience in devising fire protection systems for all kinds of fire hazards — systems which can be relied on to protect the continuity of your business and to safeguard your dollar investment. Grinnell offers you quality-controlled manufacturing, layouts by experienced engineers, and installations by skilled crews. Let Grinnell engineers help you select the right system.

16 mm. Sound-Color Film—Get up to date on fire with Grinnell's 35-minute film — "Fire Protection Through Research." Both typical and unusual fire hazards are described and demonstrated. To borrow this film, without charge, write — Grinnell Company, Providence 1, Rhode Island.

GRINNELL

FIRE PROTECTION SYSTEMS SINCE 1870

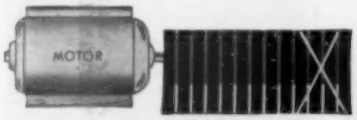
For more facts circle 671 on READER SERVICE CARD

B.F.Goodrich V belt briefs

TIPS ON THE CARE, MAINTENANCE AND SELECTION OF V BELTS FOR INDUSTRY

BFG V belts have 40% greater horsepower rating, cost no more

All B.F.Goodrich V belts now have 40% greater horsepower rating. This higher capacity rating was formerly found only in high capacity belts, but now costs *no more than former standard belts.* This means that lighter, more compact, and lower cost drives can now be used, because these B.F.Goodrich belts carry the horsepower needed for efficient drives using fewer belts at standard belt prices.



LOAD

9 V belts can now do work of 13.

What caused these failures?

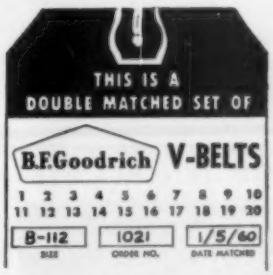
Answer: Prematurely worn sides are caused by grit, dirt or any such abrasive contact. Misalignment often causes wear on one side only. To prevent, align the sheaves, checking with straightedge or cord. Keep belts and sheave grooves clean.

Answer: Belt put on improperly, or foreign objects fell into groove to rupture cover fabric. To prevent, move motor toward driven sheave when replacing belt. If rupture was caused by foreign object, protect belts with a cover.

BFG double matching program keeps V belts matched during the life of the drive

Double-matching assures you that a set of B.F.Goodrich V belts are of equal length when installed and will stay uniform in length for the life of the belts. When V belts of different lengths are put on the same drive, longer belts loaf, while shorter ones carry all the load and fail quickly. B.F.Goodrich double-matched belts are measured *twice* for uniform length, once when manufactured and again after storage. Only belts that are of equal length when manufactured and after storage are grouped into sets.

Belts that are grouped into sets are tied together with a tag which gives the date when belts were matched. Belts which have been in storage over a year and "tag ends" are returned to BFG for replacement to make sure that your distributor always has a fresh stock of double-matched belts.



Here's the tag which goes on each set of double-matched belts, giving exact date belts were matched.

How to protect against static electricity in V belt drive

Static electricity is developed on every V belt drive. If there is an explosive atmosphere under certain conditions it can trigger an explosion.

Various means are used to get rid of this static charge. The most reliable method is in the use of static conducting V belts which are grounded to both the motor and the driven unit.

But unless the motor and the driven unit are properly grounded there can be no protection regardless of the type of static conducting V belt used.

Static conductivity in a V belt is made possible by special compounds used in the cover. Because cover wear reduces the belts' ability to conduct static, drives should be inspected frequently. Any belts showing cover wear should be replaced immediately. With any set of V belts, it is good practice to replace the entire set.

When ordering BFG Multi V belts, "static conducting" belts must be specified and cost slightly more. All BFG Maxipower V belts are static conducting and heat and oil-resistant at no extra cost.

The Question Corner—

Grommet construction is exclusive in B.F.Goodrich V belts. Grommets are two extra strong cord loops, inside the belts, like twisted cables, except they are endless. Unlike ordinary belts, there are no center cords in the Grommet belt, so it is more flexible, can "give" temporarily and absorb shock loads.

Let your B.F.Goodrich distributor show you how this higher capacity, longer belt life, ability to stand hard use, can reduce your V belt costs per year and make other savings in operating and maintenance costs.

Ask a factory-trained specialist

For help in selecting V belts for any kind of service, call the man who is a specialist in V belts—your B.F.Goodrich distributor. He can help you cut costs by getting longer life from your V belt drives. *B.F.Goodrich Industrial Products Company, Dept. M-797, Akron 18, Ohio.*

B.F.Goodrich V belts

FOR BETTER
- PLANT MAINTENANCE & ENGINEERING
- PRODUCTION
- PLANT MANAGEMENT

MAY 1960

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King-size pole spray guns make painting high places a cinch at North American Aviation (page 274) . . . Couple of ideas plus a few bucks bring **streamlined material handling** to Eaton Manufacturing (page 278) . . . **A departmental control system** proved the answer to Ford's dust problem (page 279) . . . Synchronized tape recorders and slide projectors **automate on-the-job training** for assembly workers at Bendix Aviation's Pioneer Division—make learning time productive time (page 281).

COMING

With political activity across the nation nearing fever pitch, June's special feature is a must. In it you'll discover the real story behind management's move to enter the political arena. Don't miss: "Should YOU Play the Game of Politics?"

69TH YEAR OF PUBLICATION
MAY 1960 Vol. 118 No. 5
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Your Material Handling Equipment

Towmotor Corporation and its subsidiary Gerlinger Carrier Company offer you three simple ways to improve your material handling operations . . . realize immediate savings . . . and accomplish this with little cash outlay.

1. You can put Towmotor-Gerlinger material handling equipment—fork lift trucks and material carriers—to work on a continuous round-the-clock basis through the Lease-A-Truck Plan. No down payment—no working capital tied up—just a small monthly charge.
2. You may also *rent* Towmotor-Gerlinger equipment on a short-term basis—as peak or seasonal demands require. You will start lowering handling costs immediately.
3. You can own new Towmotor-Gerlinger equipment by making reasonable monthly payments through the Towmotor-Gerlinger Time Payment Plan. Low interest rates make it easy.

Complete factory supervised maintenance can be included in any of the above plans.

You'll find Towmotor-Gerlinger handling economies consistently pay the small monthly cost many times over. For complete information on any of these profitable, money saving plans, write or contact Towmotor-Gerlinger Rental Division, Towmotor Corporation, Cleveland, Ohio.

TOWMOTOR-GERLINGER

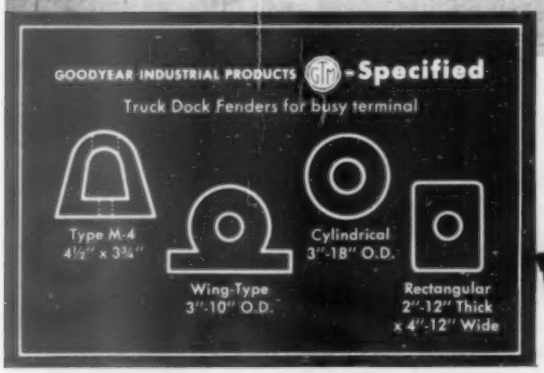
THE ONE-MAN GANG®

FORK LIFT TRUCKS, CARRIERS AND TRACTORS SINCE 1919

Gerlinger Carrier Co. is a subsidiary of Towmotor Corporation

For more facts Circle 674 on Reader Service Card

It looked like nothing could save the loading dock from constant damage at this busy Midwestern truck terminal. They tacked up some old rubber belting to keep the wood from splintering, only to have it quickly cut to pieces. They even tried special rubber fendering with no success. Then the G.T.M.—Goodyear Technical Man—sold them on giving Goodyear all-rubber Truck Dock Fenders a trial. That was a year ago. Now their dock protection problems are a thing of the past. The fenders are still in like-new condition despite the incessant punishment from the jockeying trucks. That's why their terminal expansion plans include Goodyear M-4 Dock Fenders for twenty more loading spots.



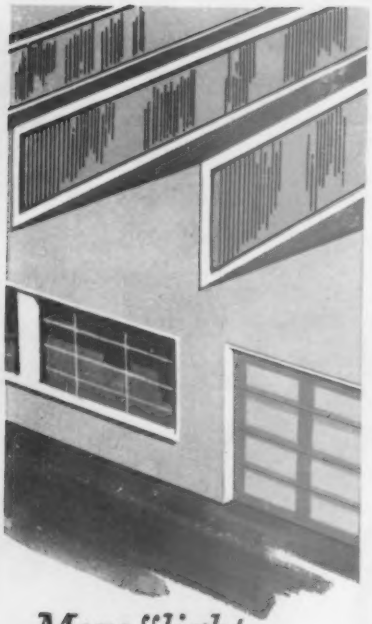
When you feel you've "tried everything" but have had no luck—ask the G.T.M. to drop in and look over the situation.

He makes a career of finding practical answers to "impossible" problems. And he's as close as a call to your Goodyear Distributor—also your source for the best in V-Belts, Conveyor Belts, Hose and other industrial products. Just look under "Rubber Goods" or "Rubber Products" in the Yellow Pages—or write Goodyear, Industrial Products Division, Akron 16, Ohio.

Lots of good things come from

GOODYEAR

THE GREATEST NAME IN RUBBER



More "light years" per dollar with Butler

Stylux BY BUTLER ®

You get more maintenance-free years of natural light in your plant when you modernize with Butler Stylux–the superior, shatterproof, translucent plastic panels for glazing.

There's a big difference in plastic panels, and the key to the superiority of Stylux is its exceptional quality. Stylux is an acrylic-fortified plastic panel . . . made from an outstandingly durable resin that protects against sun fade and weather erosion. You get more years of greater light transmission for every dollar you invest.

Get the facts from your building supply dealer, glazing contractor, or write direct.

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Kansas City 26, Missouri

FACTORY LETTERS

Power Engineering Is Usually Bypassed

Dear Sir:

Throughout this letter I'm thinking of manufacturing plants, medium-size and small—not large enough to employ a full-time plant engineer.

It's impossible for an engineer experienced in the use and management of power facilities for production plants to get an audience with top executives for even a general discussion of wastes and high costs. When such matters do come to their attention, managements call in a consulting firm—not engineers—for surveys and reports.

Another common procedure of managements is this: They decide with their purchasing executives what type of equipment is required to replace overloaded or antiquated transforming or transmission power systems for the production line. Then some manufacturers are called in and the necessary engineering is wrapped up with a potential order for equipment.

Some two years ago (possibly longer) I attended a joint meeting of the local sections of the A.I.E.E. and A.S.M.E. which presented a member of a Chicago management firm. He attempted to tell the groups "What Management Expects of Engineers." Before launching his topic, he stepped to one side of his lectern and expressed a deep-seated contempt for engineers in industry, excepting those engaged in product design and in the design of machinery for production. Needless to say, he was severely criticized from the floor when he asked for questions at the end of this discourse.

My question: **What approach can be made to the top executives of the smaller manufacturing plants for discussion of power facilities management?**—*Clement L. Kline, Practicing Mechanical Engineer, Indianapolis, Ind.*

►Your letter leaves us with a feeling of frustration. We would like to help you in your mission to convert manufacturing management to the realization of the true services that an engineering-oriented manager can offer. We have been fighting this battle with both managers and engineers over the years. It's difficult, indeed, to bring these two important viewpoints together.

Over the last few years we have printed many articles directed to the problem of conservation in the use of utilities and to foresight in the modernization of them. Not many of these are currently available in reprint form. But two that are may have particular value in your plans. They are "How to Save Real Money on Power" and "Sixteen Signs of Power Trouble Ahead."

In conclusion, I'll offer some defense for the many management consulting firms that employ competent engineers. They, as well as you and I, recognize that matters of an engineering nature can only be solved by people with engineering training or experience. But obviously, the most valuable aid is offered by the engineer who has begun to think more like a manager than like a technician.—ED.

More on "Management Breakthrough"

Dear Sir:

We were quite impressed with an article that appeared in the July 1959 issue of FACTORY (page 74)—"A Brand-New Breakthrough in Management Development."

This article would be excellent for use in our management training programs.—*Neely D. Gardner, State Training Officer, California State Personnel Board, Sacramento, Calif.*

Turn the page

NEW ELPAR ACRO-SMOOTH

with these most wanted features...

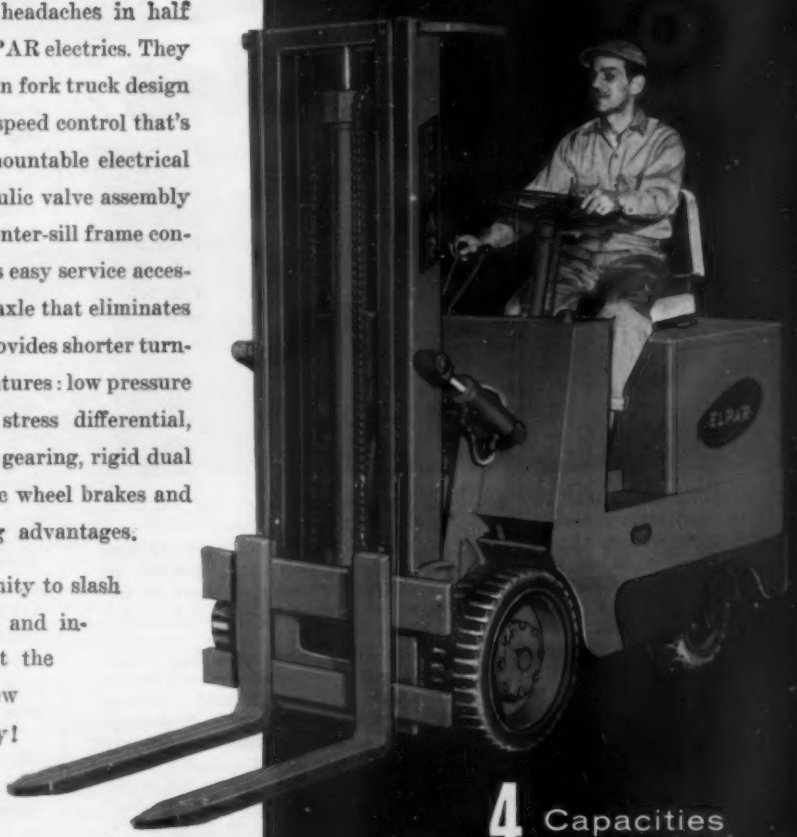
- **Smooth stepless speed control**
- **Easy, low cost maintenance**
- **Increased work output**

Cut your maintenance headaches in half with this new line of ELPAR electrics. They represent a new concept in fork truck design with . . . a new step-less speed control that's simple to maintain; demountable electrical control panel and hydraulic valve assembly for fast bench repairs; center-sill frame construction that guarantees easy service accessability; caster steering axle that eliminates steering knuckles and provides shorter turning radius. Plus these features: low pressure hydraulic system, low stress differential, completely housed drive gearing, rigid dual tilt mountings, hydraulic wheel brakes and many more cost cutting advantages.

Don't miss this opportunity to slash your maintenance costs and increase productivity. Get the facts on ELPAR's new "Acro Smooth" line today!

Send for This New Folder—get complete details on this new line of ELPAR electric fork trucks.

Slash Truck Maintenance 55%



4 Capacities
Individual models for 4,000, 5,000, 6,000 and 7,000 lbs.

THE ELWELL-PARKER ELECTRIC COMPANY
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ELPAR
ELECTRIC TRUCKS

Extra durability is a *bonus* you get along with many other proved advantages of Kinnear Rolling Doors.

Striking new proof of this was recently added to Kinnear's records of remarkably long door service: A whole battery of Kinnear Doors with 50 years of service in a busy shipping terminal *were removed from the old building for continued use in the modern structure that replaced it!*

That's why it's important to you that every Kinnear Door is *Registered*. Detailed drawings of each door are kept permanently in Kinnear's own fireproof vaults.

This is a Kinnear service that started before the turn of the century (when Kinnear *originated* the door with the interlocking-slat curtain).

You can be sure that, *at any time in the future*, correct replacement for any worn or damaged parts of any Kinnear Rolling Door will be available promptly.

In addition, Kinnear Rolling Doors save space . . . coil completely out of the way . . . clear the entire opening . . . remain out of reach of damage while opened . . . complement any building architecture . . . and assure all-metal protection against wind, weather, trespass or vandalism. Built to fit any opening, in new or old buildings. Power operated if desired. *Write for full details!*

The KINNEAR Manufacturing Company

FACTORIES: 1540-60 Fields Ave., Columbus 16, Ohio; 1742 Yosemite Ave., San Francisco 24, Calif.

Offices and Agents in All Principal Cities

Saving Ways in Doorways

KINNEAR ROLLING DOORS

FACTORY / LETTERS

Begins on page 6

Dear Sir:

In your July 1959 issue there was an excellent article entitled "A Brand-New Breakthrough in Management Development." In it you mentioned that this was a part of National Training Laboratories' annual training course.

We would very much like to have further information on this course, including a description of the subject matter, requirements for entrance, cost, etc. If you do not have this available, perhaps you could give us the name of the proper person to contact for it.—*R. W. Wolfe, Plant Engineer, Visking Co., Terre Haute, Ind.*

►We have had many requests for more information on NTL's training program. You can get this by writing direct to Dr. Leland P. Bradford, National Training Laboratories, 1201 Sixteenth St., N.W., Washington, D.C.—ED.

Plaudits From a Pro

Dear Sir:

We were recently privileged to read the article: "The Alcoholic: Who He Is, How You Can Help Him," which appeared in FACTORY's June 1959 issue (page 244).

Your article came to our notice at a time when several more large companies here in Australia are giving serious consideration to taking practical steps designed to cope with the alcoholic problem in their plants. It occurs to us that you may favorably consider our making a reprint of your article.

Permit us to congratulate you on the comprehensive manner in which this particular field has been covered; and we will be sure to keep an alert lookout for any subsequent articles.

If you approve of our reprint

FACTORY welcomes opinions and suggestions from its readers. They help us put management problems in better perspective. Letters should be addressed: The Editor, FACTORY, 330 West 42nd St., New York 36.

For more facts Circle 678 on Reader Service Card

Use Bradley Washfountains in all of these locations

GROUPED IN LARGE WASHROOMS

Many can wash quickly and simultaneously in installations like the above—a dozen Washfountains.

IN LOCKER ROOMS

Such placement makes Washfountains readily reached from each employee's personal locker. Proper washing is encouraged.

Full circle model 54-in. and 36-in. diameters—precast stone, stainless steel—vitreous enamel pressed steel.

NEAR TOILET ROOMS

In this plant stainless steel Washfountains in groups of three are installed near toilets at each end of three factory floors.

FOR THE WOMEN

Washfountains are appreciated by the girls, either in wash and locker rooms, or in rest rooms.

Semi-circular model—same diameters and materials as full circle models.

NEAR CAFETERIA ENTRANCE

Semi-circular wall type Washfountains in corridors near cafeteria encourage cleanliness and save time.

FOR OFFICE STAFFS

THE SMALL WASHFOUNTAIN

The same ultra sanitary features of the larger Washfountains—foot control of water, faucets replaced by sprayhead, and self-rinsing bowl. Thorough washing with no faucet contacts.

They are used in office staff washrooms, first-aid rooms, visitors' and ladies' restrooms.

More Washing Facilities in Less Space, and Lower Installation and Maintenance Costs

Throughout the nation Bradley Washfountains are in daily use in mill, mine and factory—recognized for the past 30 years or more for the economy, convenience and ultra-sanitary features that these group type fixtures provide.

There are no faucets to manipulate or maintain, no chance of collection of contaminating water in the big bowl since it is self-rinsing—and real economy of installation—*one set* of plumbing connections suffices for each *8 to 10* person Washfountain. And they cut washup time.

For new buildings and remodeling you can get both economy and the maximum in safe sanitary wash facilities with Bradley Washfountains . . . To have all necessary details write today for free copy of new Catalog 6002.

BRADLEY WASHFOUNTAIN CO., 2215 West Michigan St., Milwaukee 1, Wis.

Write for Catalog 6002. No Obligation.

Bradley

BRADLEY *washfountains*

For more facts Circle 679 on Reader Service Card

The truck with

"boarding house reach"

INCREASES WAREHOUSE CAPACITY

. . . as much as 50%

RAYMOND

Reach-Fork

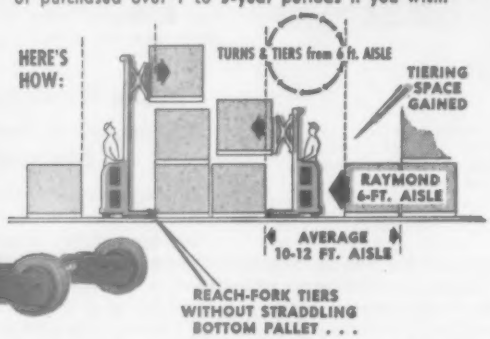
TRADE MARK

3000 lb. CAPACITY

WHY BUILD OR LEASE additional storage when there's space to be had right in your present warehouse? A Raymond Reach-Fork . . . the truck with "boarding-house reach" . . . may increase your warehouse capacity up to 50%.

THE REACH-FORK eliminates wasteful 10 to 12-ft. aisles . . . permits you to tier in space-saving 6-ft.* aisles. No special racks or pallets required because it operates from the aisle, without straddling bottom pallet. Its forks extend to pick up or deposit your load . . . retract in seconds.

IDEAL FOR LOADING and unloading. Stacks pallets closely on racks, in truck trailers, boxcars, bulk storage areas. Safe on elevators and low-capacity floors. Raymond power unit is highly accessible, opens up like a book for ease in servicing. Reach-Fork available in 2,000 or 3,000 lb. capacities . . . may be leased or purchased over 1 to 3-year periods if you wish.


HERE'S HOW:
TURNS & TIERS from 6 ft. AISLE
TIERING SPACE GAINED
RAYMOND 6-FT. AISLE
AVERAGE 10-12 FT. AISLE
REACH-FORK TIERS WITHOUT STRADDLING BOTTOM PALLET . . .

MODEL E3RT Reach-Fork Electric Tiering Truck. Telescopic model, 3,000 lb. cap.

*For exact aisle width, ask Raymond representative to survey your operation.

THE RAYMOND CORPORATION

3231 Madison St., Greene, N.Y.

MAIL COUPON TODAY

Please send Bulletin on Raymond Reach-Fork. I am interested in:

- ☐ 2,000 lb. cap. Reach-Fork.
- ☐ 3,000 lb. cap. Reach-Fork.
- ☐ Have a representative call.

NAME _____ TITLE _____

COMPANY _____

STREET _____

CITY _____ STATE _____

suggestion, we feel sure that many other companies will become further interested in the whole subject of the impact of alcoholism on their production costs. And more in-the-plant programmes to help alcoholic employees will, in due course, develop as a result.—*O. S. Williams, Executive Director, The Foundation for Research and Treatment of Alcoholism, Sydney, Australia.*

Better Housekeeping

Dear Sir:

We are planning to set up a good housekeeping program in our plants. Can you send us information or recommend some publications on organization and procedure for maintenance? Ours is a light manufacturing operation of electrical assemblies and equipment. *—Carl McConkey, Plant Manager, The Hallicrafters Co., Chicago.*

►We suggest a study of Section 14 (about 60 pages) on "Sanitation and Housekeeping" in the Maintenance Engineering Handbook, edited by L. C. Morrow (McGraw-Hill Book Co., 330 West 42nd St., New York 36). You will probably find in this section most of the answers to your questions.—ED.

FACTORY

May 1960 Vol. 118, No. 5

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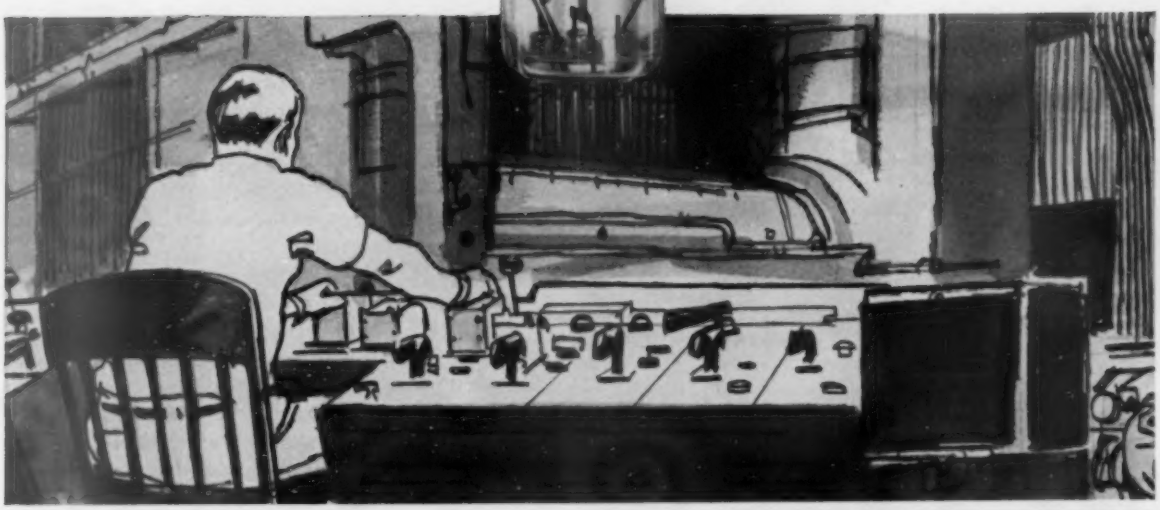
SYLVANIA INDUSTRIAL TUBES

take the loads reliably



Sylvania Industrial Electronic Tubes prove their ability in daily use to withstand widely varying load conditions. Vibration? Shock? They're built to take that, too, and still perform reliably.

Next time you need superior-quality replacement tubes see your *Sylvania Industrial Tube Distributor*. Better yet, see him soon and have your replacements on hand. He handles the full line of Sylvania Industrial Tubes for resistance welding, electronic control, induction heating and dielectric heating equipment.

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POPULAR SYLVANIA GAS TUBES FOR CONTROL APPLICATIONS

Sylvania Type	Starting Voltage	Operating Voltage	Operating Current (ma) Min.	Max.
VOLTAGE-REGULATOR TYPES				
0A2	155	150	5	30
0B2	115	105	5	40
0B3	125	90	5	30
0C3	135	105	5	40
0D3	180	150	5	40
5644	130	95	5	25
VOLTAGE-REFERENCE TYPES				
5651	115	87	1.5	3.5
6308	115	87	1.5	3.5

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from BRUNNER
SINCE 1906

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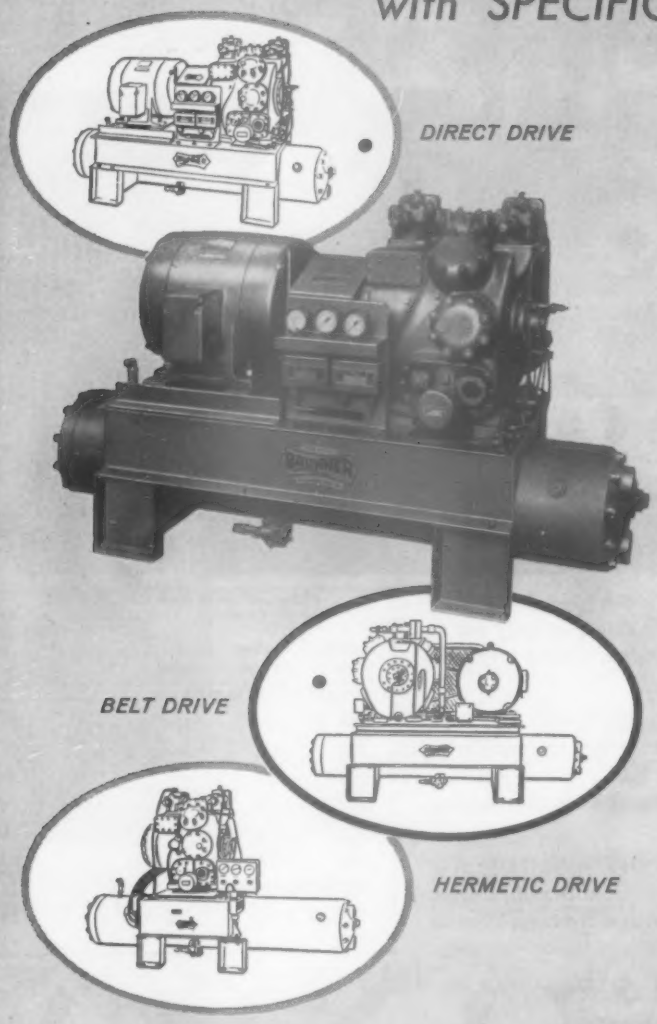
with SPECIFICATION FLEXIBILITY



Again—from the leader—
a beneficial advance in compressor adaptability.

Brunner's new line of multi-drive units can fully satisfy *any* compressor requirement . . . providing a specification flexibility that substantially widens application latitude.

As illustrated, the line includes the direct drive model, the hermetically sealed model, and the belt-driven model. And to ensure the integrity of performance for which Brunner has been famous for fifty-three years, these units are constructed of only the highest grade materials; and are equipped with built-in capacity control, oil control valves, replaceable cylinders, and other important features.

The line's horsepower range is 7½-100. Each model is obtainable in either the water-cooled or the evaporative type.

For more information, contact the Dunham-Bush sales engineer near you, or write for Form No. 775.

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"Here at MINNESOTA MINING we're coating*

3M COMPANY has branched out from its original sandpaper business into a wide variety of product lines. However, most of these product lines are direct descendants of sandpaper, 3M's original product, in the sense that *coating techniques play an important part in these products. This is true of such seemingly unrelated items as presensitized lithographic plates, pressure sensitive tapes, decorative ribbon, roofing granules and reflective sheeting.

As specialists, we liked the OTIS specialist's approach to Elevator Maintenance right from the start. We decided it was the only way to keep our 6 OTIS Passenger Elevators and 10 OTIS Freight Elevators running at their original efficiency during their entire lifetime. We've been using OTIS Elevator Maintenance since 1933.

What is the OTIS specialist's approach to elevator maintenance? It is MEN . . . MATERIALS . . . METHODS.

MEN: Elevator maintenance is no one-man job. It is an organization task requiring experts in many lines. No individual, even if he devoted his entire time to the job, could do it properly. It calls for men with an unusual combination of skills plus long training in studying parts, assemblies, functions, replacement procedures, testing and adjusting. Some degree of elevator complexity can be gleaned from the illustration at the right.

MATERIALS: Original OTIS parts and specially designed OTIS maintenance equipment are within one hour of 90% of all OTIS elevators in the U. S. for use in scheduled replacements—and to hold emergency shutdowns to a minimum.

METHODS: With more than 40,000 elevators under OTIS maintenance, OTIS has developed an actuarial procedure that replaces wearing parts well in advance of their breakdown point to hold shutdowns to an absolute minimum and assure the highest possible safety.

freight elevator maintenance

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OTIS

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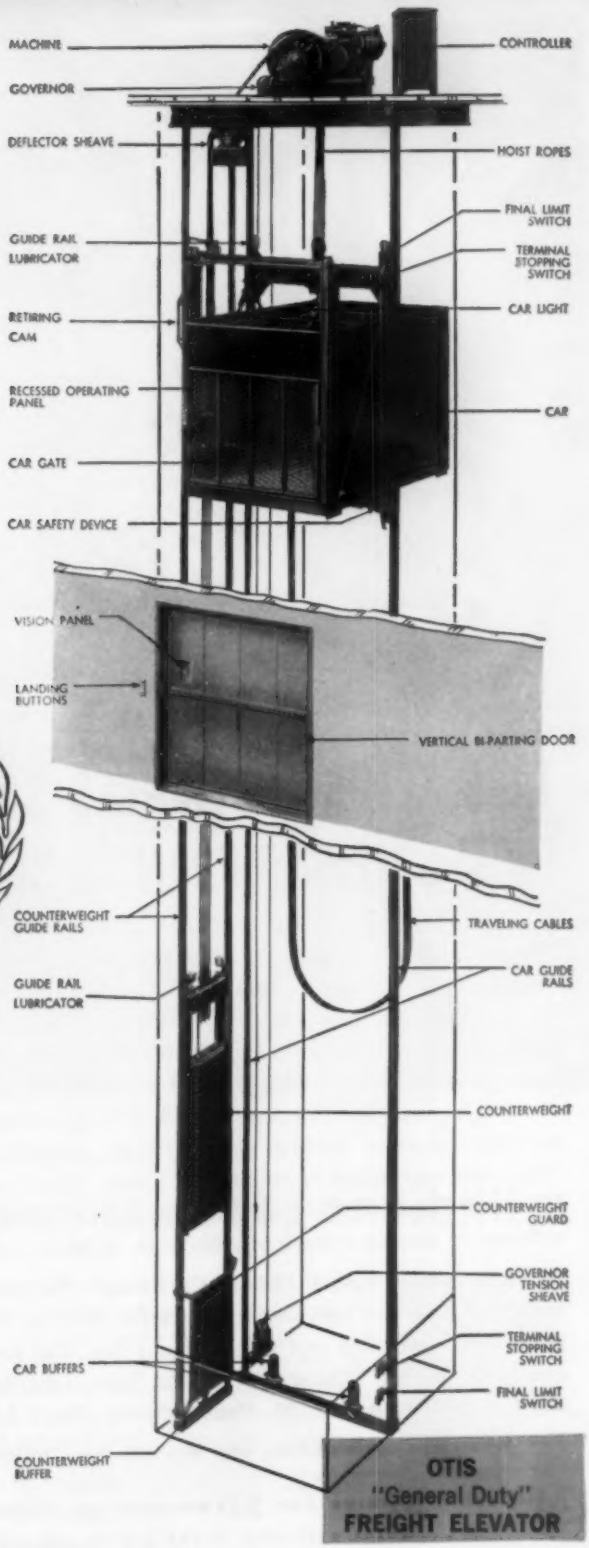
OFFICES IN 297 CITIES ACROSS THE UNITED STATES AND CANADA

men . . . not elevator maintenance men"



3M COMPANY

MINNESOTA MINING
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All it takes is a few pennies worth of various "SCOTCH" BRAND Filament Tapes to protect many dollars worth of merchandise. These tapes, developed specifically for the appliance industry, stand up to the roughest, toughest handling. A few short strips hold drawers, shelves, lids, and latches securely in place during shipment. Keeps them in their place in spite of jolts, jars, and jiggles.

On in seconds, "SCOTCH" Filament Tapes stick at a touch . . . no heavy tools or muscles needed. Won't scratch or mar finishes. Won't cut customers' or employees' hands. What's more, "SCOTCH" Filament Tapes strip off quickly and cleanly upon arrival without staining or leaving a trace of residue on finished surfaces.

What's your line? "SCOTCH" BRAND Filament Tapes offer dozens of time and cost-saving shortcuts. Holding, bundling, carton reinforcing, unitizing just to mention a few. For more information, call your nearest "SCOTCH" BRAND Tape Distributor, or write: 3M Co., 900 Bush Ave., St. Paul 6, Minn., Dept. IAE-50.

When tape costs so little, why take less than "SCOTCH" Brand?

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MINNESOTA MINING AND MANUFACTURING COMPANY
. . . WHERE RESEARCH IS THE KEY TO TOMORROW

3M COMPANY

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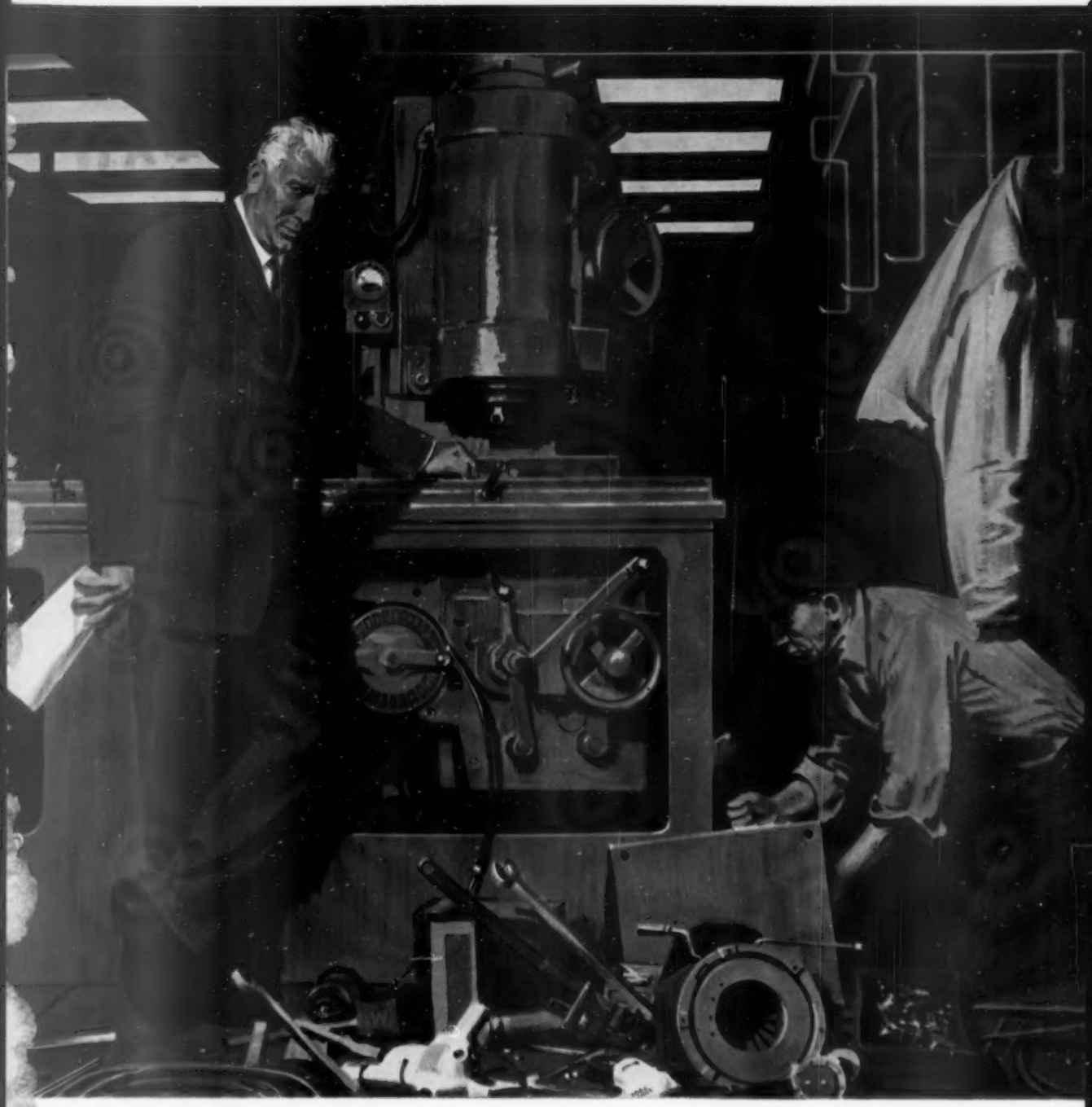

NOW HE KNOWS WHY

lubrication is a management responsibility

MANAGEMENT *does* have a stake in good lubrication practices.

If you recognize lubrication for what it is — a cost-reducing tool, not an expense item — you can effect savings that add up to many hundred times the cost of the lubricants themselves. Yet only management has the authority to make these potential savings an actuality. That's why lubrication is your responsibility. **Texaco can help you achieve these savings.** Texaco Lubrication Engineers have had valuable experience in tailoring Organized Lubrication Programs to the needs of virtually every industry. They can help show *you* the way to important savings. Why not talk to your nearest Texaco Lubrication Engineer today — or write for our new Book "Organized Lubrication — Major Cost Control Factor."

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LUBRICATION IS A MAJOR FACTOR IN COST CONTROL

Uses Skyway For Handling Materials AUTOMATICALLY

Completely Pays for Itself Every Three Years

◀ Loading a van on the second floor of a building. This same van also may be lowered to the floor below for loading. Although the building at this end of the system is quite old, the Cleveland Tramrail equipment was easily installed.

For years this vast roof area did nothing more than provide protection from the weather. Now it is being used profitably for materials handling. Illustrated is the van emerging from the penthouse. ▼

BY erecting a Cleveland Tramrail materials handling system over the roofs of its buildings, a large plant is able to transport materials between departments located in widely separated buildings at very low cost.

Because the system operates automatically, the Tramrail carrier travels back and forth without any operator. The carrier van is loaded or unloaded at convenient areas inside the buildings. Pressing a button sends it on its way. It rises vertically to a penthouse on the roof. Then it makes its run over the track system to the penthouse at the other end. Here it lowers to the floor inside for loading or unloading.

The system eliminates considerable floor traffic and saves space required for wide aisleways. It operates at any time, day or night. Inclement weather does not hinder it. The system requires only a fraction of the maintenance necessary for floor handling equipment. It does not wear or damage floors. It is a big aid to safety. In addition to these important benefits, the Cleveland Tramrail system makes tremendous time savings — enough to completely pay for the entire installation every three years.

Cleveland Tramrail has had wide experience in automatic dispatch materials handling systems of many types. Our engineers will welcome an opportunity to work with you.

CLEVELAND TRAMRAIL

Overhead Materials Handling Equipment

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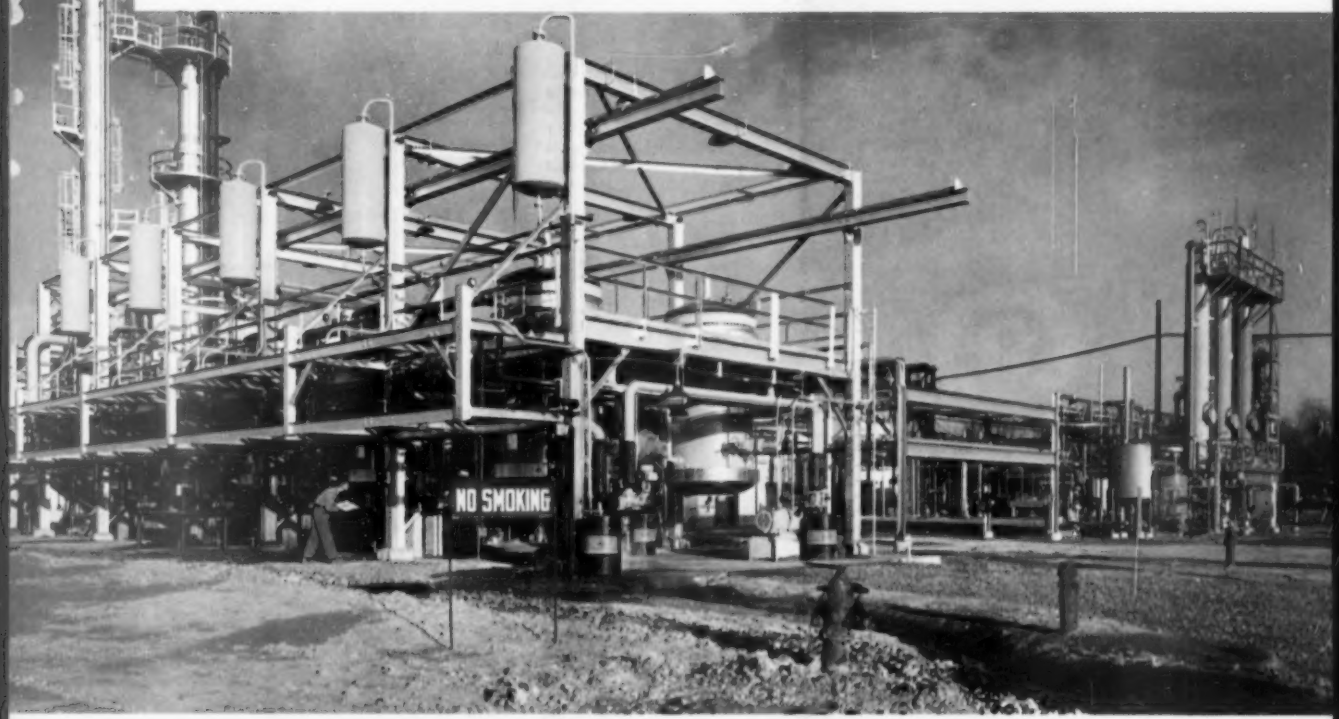
CORROSION PROTECTION

In Depth . . . With Color!



Wherever your plant and equipment are subject to critical acid, alkali or solvent exposures even at elevated temperatures, high humidity, severe weathering — or any combination of these — one of Truscon's corrosion control systems will provide maximum protection at lowest cost per square foot per year.

Truscon will also provide guidance in proper surface preparation, coating application, and inspection. For a detailed, written specification on protection of steel, iron, aluminum, concrete, and other surfaces, call the Truscon branch nearest you, or write Truscon Laboratories for specific information.

TRUSCON *Laboratories*

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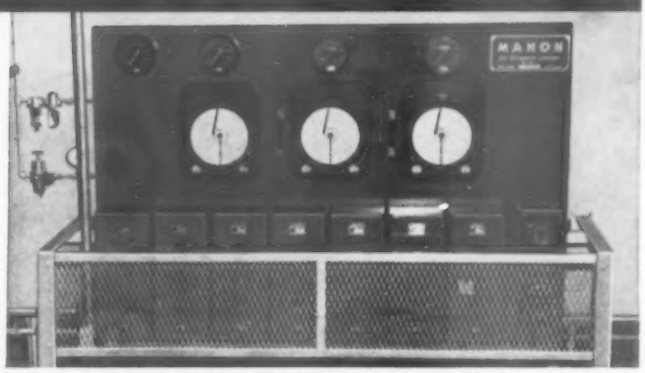
PROCESS EQUIPMENT .... BY MAHON

new plastic-curing oven system for GOODYEAR is double-decked for efficiency

Curing of 75-ft. long, 7-ft. wide sections of a spongy plastic material, with heating and cooling cycles rigidly controlled, is a tough processing problem. Mahon equipment does the job two-at-a-time . . . and also automates the method! This new oven system converted the operation to a smooth, continuous process.

The unusual installation (shown above) is 80-ft. long with double-decked ovens for increased capacity. Specially developed by Mahon and Goodyear engineers, the system features integrated materials handling, precisely controlled heating and rapid cooling. Curing is done at preset temperatures up to 300°F, the ovens holding the plastic sections for about eight hours. At the end of this cycle, the entire system is fast cooled, the work discharged and the ovens brought back up to heat—all automatically.

If you are considering new or improved process equipment call in a Mahon engineer . . . their assistance could prove invaluable.



Special oven control panel, designed by Mahon for the Goodyear Tire and Rubber Co., monitors the entire eight-hour curing cycle for the plastic material.

Write for Descriptive Catalog A-660 on the scope of Mahon Industrial Equipment for metal finishing, cleaning, painting, heating, heat treating, etc. Also in Sweet's Plant Engineering File.

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Detroit 34, Michigan

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MAHON

FACTORY

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Even at 1000 to 1 odds...

YOU WOULDN'T MAKE A RED CENT

...on a bet like this!

If you bought 1,000 G-E Fluorescent Lamps and gave us $1 for every one that lit . . . and we gave you $1,000 for every one that didn't . . . chances are *the best you could do is break even!*

Those are pretty good odds—1,000 to 1. But if this bet is ever offered to you don't take it. You wouldn't make a red cent!

BECAUSE G-E MONEY SAVER LAMPS ARE MORE UNIFORM—Test after test of production lamps proves that, on the average, *999 out of every 1,000 G-E Fluorescents will be good, right from the start.* (You might even *lose* money on the bet because many actual users report their performance to be even better than this!)

G-E FLUORESCENT LAMPS DO SAVE YOU MONEY—Whether you buy a carton or a carload, the uniformity you get from General Electric Fluorescents—lamp after lamp after lamp—is your best assurance of getting the most light for your money. Not only do you get 999 sure starters out of every 1,000 G-E Fluorescent Lamps you buy, but after almost two years 990 of them will still be going strong! So you not only get more light, but your maintenance and production people like the freedom from annoyance and interruptions.

Performance like this stems from General Electric's constant search for new ways to improve *all* G-E Fluorescent Lamp types. Make sense? Then place your next order for lamps with your G-E Lamp distributor now—or write: General Electric Co., Large Lamp Dept. C-013, Nela Park, Cleveland 12, Ohio.

Progress Is Our Most Important Product

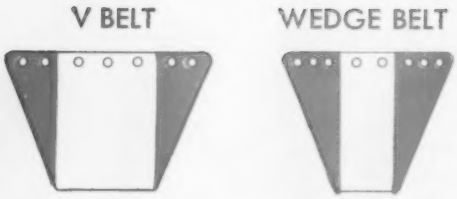
GENERAL ELECTRIC

GENERAL ELECTRIC . . . WHERE BRIGHT IDEAS BECOME BETTER LAMPS

An important Worthington message about

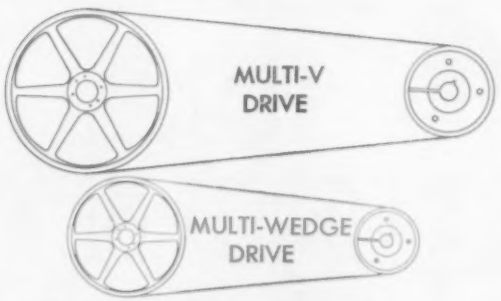
THE COMING CHANGEOVER FROM

Recently you may have seen a number of announcements promising "super" V-belt drives that are considerably smaller and less expensive. What these manufacturers are talking about, of course, is the new Wedge belt which will soon replace conventional V belts for new belt



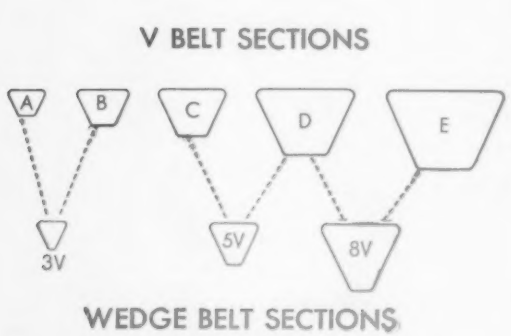
Q. What is a Wedge belt?

A. The cord layer near the top of a V belt carries the load. This layer, however, is only efficient in the portion supported by side walls (red areas). Because it is more of a pie shape, a Wedge belt increases the overall efficiency of a V belt. The Goodyear Tire and Rubber Company (manufacturer of Worthington-Goodyear V belts) was the first to offer a Wedge belt (in 1948). This fine product, however, was sold primarily for automotive applications.



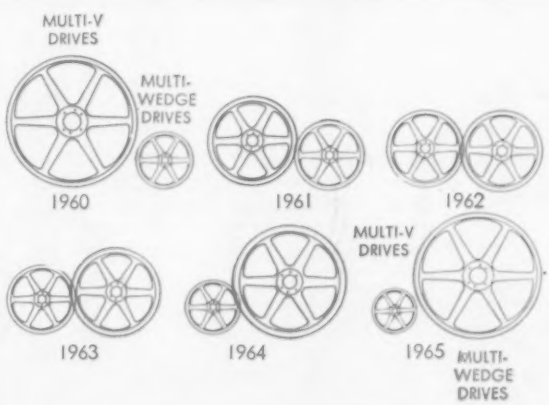
Q. What are the advantages of Wedge belts?

A. Smaller size, lower cost. Because the new Wedge belts are more efficient, you need fewer belts and smaller sheaves to carry the same horsepower load. Sheave diameters can be reduced 30 to 50%. Center distances can be cut 20%. And initial cost can be as much as 20% less.



Q. What belt sizes will be available?

A. Since the smaller Wedge belt does more work than the other V belt, it has been possible to reduce the number of sizes without loss of flexibility. The new Wedge belts will be available in three standard sections, 3V, 5V and 8V. The new nomenclature simplifies identification. The 3V belt is three eighths of an inch in width (measured at the top); the 5V belt is five eighths; the 8V belt, eight eighths, or one inch. Stock 3V and 5V sheaves will cover horsepower ranges up through 200 hp. Made to order 8V sheaves will be used for 200 to 2,000 hp. requirements.



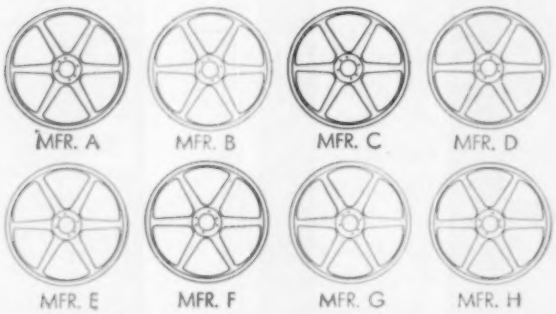
Q. Will multi-V drives continue to be available?

A. Worthington has no intention forcing any customer to switch to the new Multi-Wedge drive. The choice is up to you. We will continue to manufacture and stock both drives as long as there is a demand for both. We expect that many customers will need replacement belts and sheaves for Multi-V drives for many years. The chart above indicates how we expect the market to be divided in the years ahead.

MULTI-V TO MULTI-WEDGE DRIVE

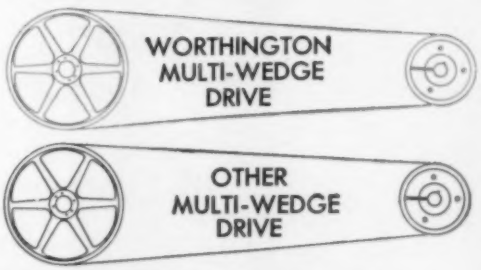
drive applications. On these pages Worthington—maker of the QD (Quick Detachable) sheave, the industry's largest seller—explains the significance of the coming change-over. If you would like more information please write to Worthington Corp., Section 79-25, Oil City, Pa.

WORTHINGTON



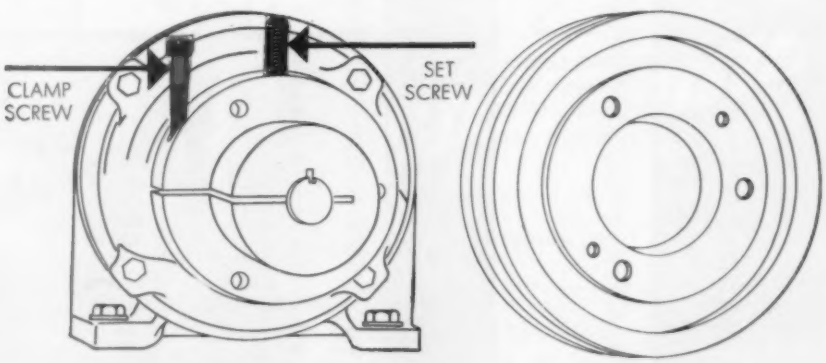
Q. Will all drive manufacturers make the changeover?

A. All indications are that the majority of Multi-V drive manufacturers are going to switch to the new Wedge belts. Of the eight leading builders, five (including Worthington) now also offer Multi-Wedge drives.



Q. Will different brands be interchangeable?

A. So far all Multi-Wedge drives introduced are being offered in the same belt and sheave sizes. Since Worthington and its QD licensees enjoy the largest share of the market, you can be doubly sure of having a dependable source of supply if you buy your Multi-Wedge drives from Worthington. All stock QD sheaves are being built to standardized dimensions by all QD manufacturers and are therefore interchangeable.



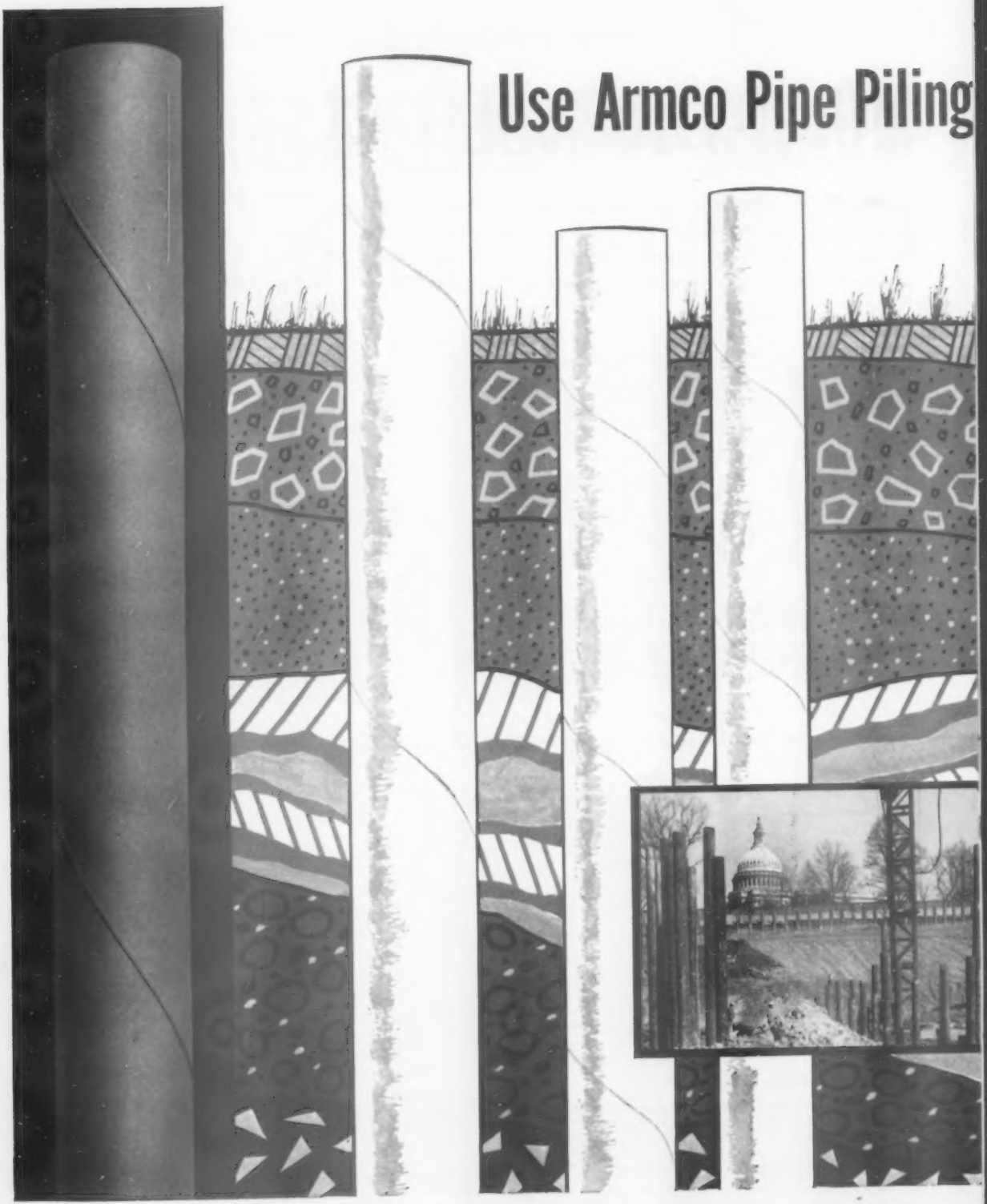
Q. Are all Multi-Wedge drives alike?

A. Whether you buy a new Multi-Wedge drive or the older Multi-V drive, the major difference between brands will be the quality of the belt and the method of locking the hub to the shaft. Worthington QD (Quick Detachable) sheaves, with their two Golden Screws are preferred by plant operators because of their positive locking arrangement.

The clamp screw simplifies installation and assures permanent alignment. You can install QD sheaves one part at a time. No heavy rim and hub combination to inch delicately into place. If change in speed is required, you simply install another sheave on the hub which remains anchored to the shaft. The clamp screw is an exclusive Worthington feature.

The set screw prevents "key drift." It locks the key securely in place, avoiding the danger of the key drifting off and becoming a safety hazard. Because of the exclusive clamp screw it is possible to use a set screw without causing hub distortion that might cause eccentric runout.

Use Armco Pipe Piling



...You can check it where it counts most

IN THE GROUND

When you specify and use Armco Steel Pipe Piling, you'll find advantages that no other type of foundation product can deliver. *After it's in the ground,* you can make a quick, sure check for alignment and watertightness. A light or reflector lets you see all the way to the bottom. You *know* where each pile goes—no doubt about it.

You can get Armco Pipe Piling in 132 different diameter-wall thickness combinations. Lengths are practically unlimited. In addition, you can meet foundation pipe needs from lightweight Armco HEL-COR® Pile Shells. These shells are available in diameters from 10⅝" to 22". Thus, it is an easy matter to specify an Armco Foundation Pipe that meets your *exact* requirements. Get details now. Send coupon for 16-page catalog on Armco Foundation Products. Armco Drainage & Metal Products, Inc., 5670 Curtis Street, Middletown, Ohio.

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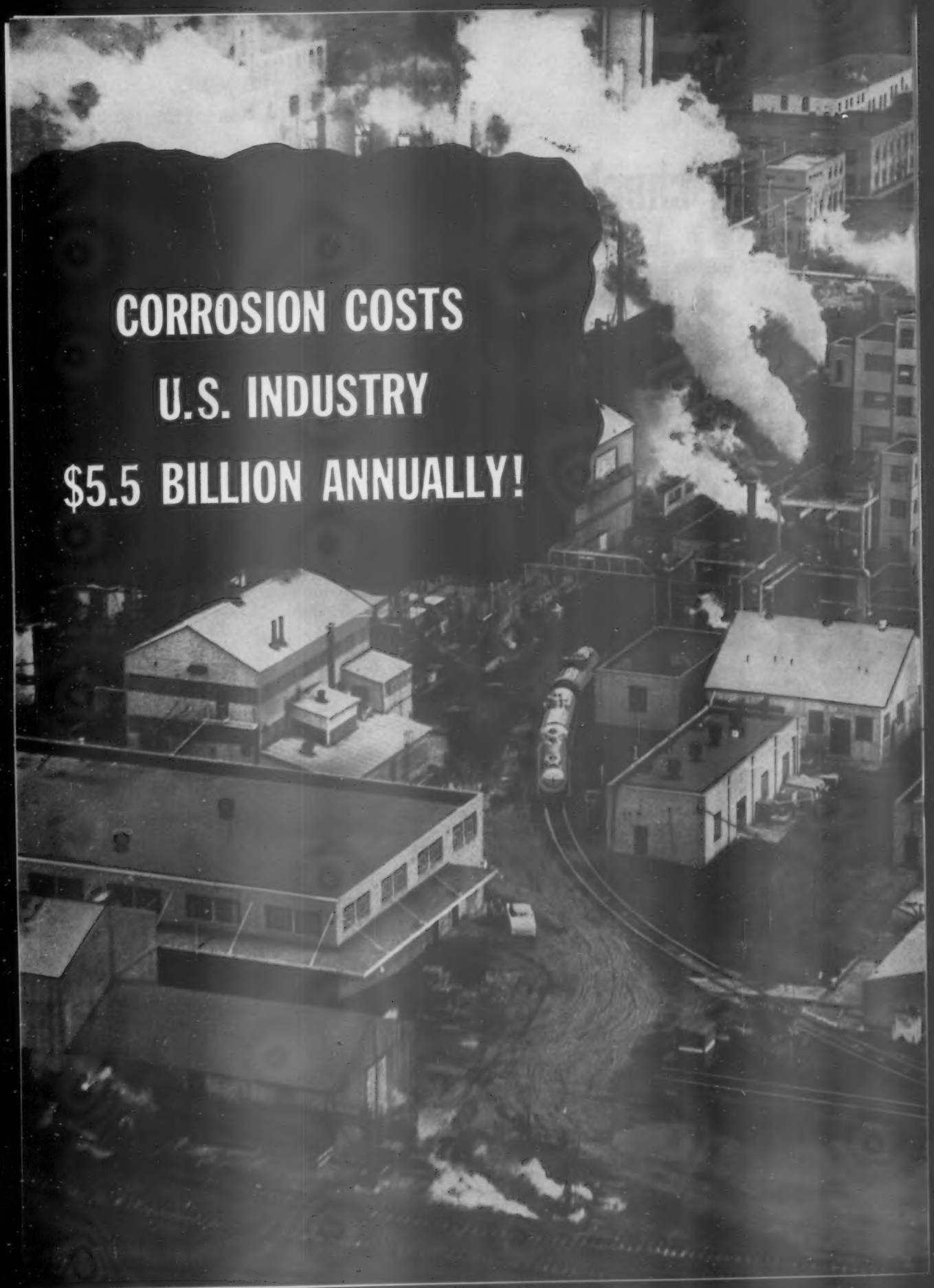

CORROSION COSTS
U.S. INDUSTRY
$5.5 BILLION ANNUALLY!

Now You Can Control 97% of All Your Corrosion Problems with this Proven PITT CHEM® Coating System!

Corrosion is one of the biggest profit robbers in American industry today. It is conservatively estimated that corrosion costs U.S. industry $5.5 billion annually . . . or $9,468 per minute! How much is this enormous waste costing *your* plant?

More and more corrosion engineers are turning to the *complete* PITT CHEM System of thick-film, cold-applied coatings for efficient long-lasting protection against corrosion. The PITT CHEM system is composed of over 20 different coatings, each formulated to control a specific type of industrial corrosion—from the most ordinary to the most severe—at minimum cost.

PITT CHEM Tarset, Tarmastic and Insul-Mastic are tough, *heavy film* coatings that outlast conventional maintenance paints 10 to 20 times. You measure their protection in *decades*, not years. They can be cold-applied by brush, spray gun or roller. No other family of protective coatings can solve so *many* of your corrosion problems so *economically*.

For more information, mail the coupon below. Then consult your nearest PITT CHEM Distributor—he's listed in the "Yellow Pages." Or call Pittsburgh Coke & Chemical Company in Pittsburgh, New York, Chicago, Houston or Los Angeles. A PITT CHEM Corrosion Engineer will be glad to discuss your corrosion problems without obligation.

PITT CHEM TARSET®

The original, patented coal tar-epoxy coating, Tarset is being used throughout industry to solve corrosion problems that were once considered "impossible." This revolutionary cold-applied coating is ideal for the protection of underground storage tanks, pickling tanks, high temperature steam lines, waste tanks and similar equipment.

PITT CHEM TARMASTIC®

PITT CHEM Tarmastic coatings are a series of coal tar protective coatings designed to meet a wide variety of corrosive conditions at moderate cost. Their protective ability has been proven by years of service on concrete, stone and masonry surfaces, cooling towers, fan housings, tank exteriors, potable water systems and similar equipment.

PITT CHEM INSUL-MASTIC®

A series of high quality Gilsonite-asphalt mastics recommended for economical, long-lasting protection against moisture and atmospheric corrosion. Widely used as a weather and moisture barrier over metal buildings and equipment. Insul-Mastic insulating cork mastics provide good heat loss reduction and condensation control.

PITT CHEM PIPELINE ENAMELS

PITT CHEM Coal Tar Pipeline Enamels protect oil and gas transmission and distribution lines throughout the United States. These proven, high quality enamels are geared to meet a wide variety of underground service conditions and are backed by experienced technical field service.

Send for Your Free Copy of this

INDUSTRY CORROSION DATA FILE

Includes a survey of corrosion problems in general industry, data on PITT CHEM Coating Systems and a coating selector guide.

Name _____ Title _____

Company _____

Street _____

City _____ State _____

PROTECTIVE COATINGS DIVISION

PITTSBURGH CHEMICAL CO.

GRANT BUILDING PITTSBURGH 19, PA.

A Subsidiary of PITTSBURGH COKE & CHEMICAL COMPANY

Circle 693 on Reader Service Card

1100

new 1960 RLM Specifications Book

Brings you New and Upward Revised Standards

BUT

...remember this important fact, this new Edition Announcement emphasizes that RLM Specifications for industrial lighting units are not fixed Standards. They are Quality Standards that advance with the Industry and the Science of Illumination.

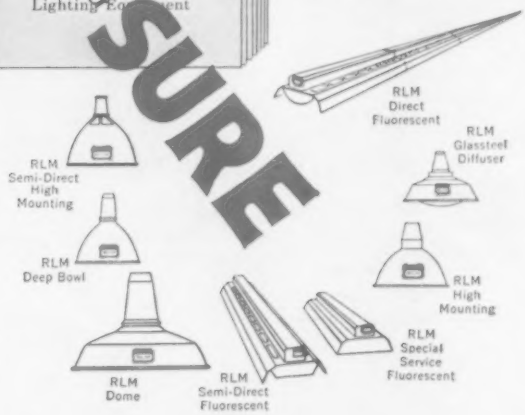
THE FINAL INGREDIENT

PRODUCT QUALITY
LIGHTING QUALITY

OF BEING SURE

RLM Standards are Product Quality and Lighting Quality Standards for Industrial Lighting Equipment. They are moving standards—they move upward with each advance in the art of illumination and with the technological advances for manufacture. That's why we have annual editions of the RLM STANDARDS SPECIFICATIONS BOOK. That's why the 1960 Edition, now off the press, should be in the hands of all who buy or specify lighting—and its quality specifications should be known to all makers and sellers of industrial lighting equipment. For your complimentary copy, mail the coupon today.

These TWIN QQ's to Industrial Lighting Success are guaranteed with all lighting equipment bearing the RLM Label. And again for 1960, there are new and revised STANDARDS! They include: New Specs for 1500 MA HIGH MOUNTING FLUORESCENT units. Semi-Direct Porcelain Enameled and Aluminum units. • GROUNDING of all component parts. • CONTINUITY OF GROUNDING throughout a continuous row. • SILVER PLATED CONTACTS in all "rapid start" units. • NEW SYNTHETIC ENAMEL Specification for component parts cover (1) rust inhibiting undercoating (2) adhesion (3) hardness.



RLM STANDARDS INSTITUTE, Inc. Suite 8295, 326 W. Madison, Chicago 6, Ill.

Send free full information including the New 1960 Edition of the RLM SPECIFICATIONS BOOK. (Please write name, company and address in margin below.)

R-764

For more facts Circle 694 on Reader Service Card

For more facts Circle 695 on Reader Service Card ➤

NOTICE!

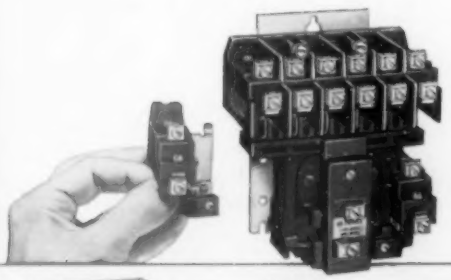
60 Second Contact Convertibility

ALLEN-BRADLEY CONTROL RELAYS

can thus easily be changed from N.O. to N.C. (or vice versa)

Why not give yourself a real surprise! We refer to the ease with which you can convert the contacts of these Allen-Bradley Bulletin 700 Type BR control relays. Using only a screwdriver, contacts can be changed from normally open to normally closed (or vice versa) in seconds—without removing the relay from its mounting—or its wiring. This "on-the-spot" convertibility certainly suggests an appreciable moneysaving reduction in your relay inventories.

Extensive tests have proven conclusively that the Bulletin 700 Type BR relays are good for many—and we mean *many*—millions of trouble free operations. A "built-in" permanent air gap completely eliminates all possibility of magnetic sticking. Naturally, the double break, silver contacts never need attention. Also, the molded coil is your assurance that even the most severe atmospheric conditions cannot cause trouble. Please write for full details on these relays today!



BUT HEAR THIS!

In the event that when "on-the-job" it is discovered that something was either overlooked or added, the standard Bulletin 700 Type BR—either 2, 4, or 6 pole relay—can easily have added to its base, out in the field, either one or two switching poles. It is done as easily as "falling off a log."

General-Purpose
NEMA 1

Explosion-proof
NEMA 7

Waterproof
NEMA 4

FIVE RELAYS IN ONE
This shows how a Type BR relay can be arranged —in seconds—to do the job of five different relays.
3 N.C.—1 N.O.
3 N.O.—1 N.C.
4 N.C.
2 N.O.—2 N.C.
4 N.O.

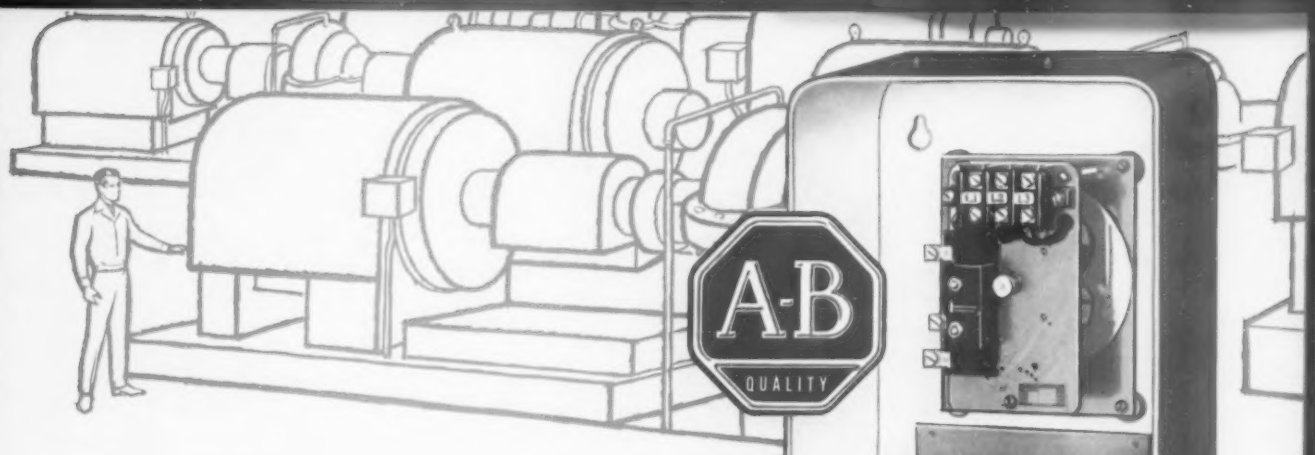
B-60-RM

ALLEN-BRADLEY

Member of NEMA

Allen-Bradley Co., 1319 S. Second St., Milwaukee 4, Wis. • In Canada: Allen-Bradley Canada Ltd., Galt, Ont.

QUALITY MOTOR CONTROL



ALLEN-BRADLEY PHASE FAILURE *and* PHASE REVERSAL RELAYS

will provide positive protection for high-horsepower, high-priced motors!

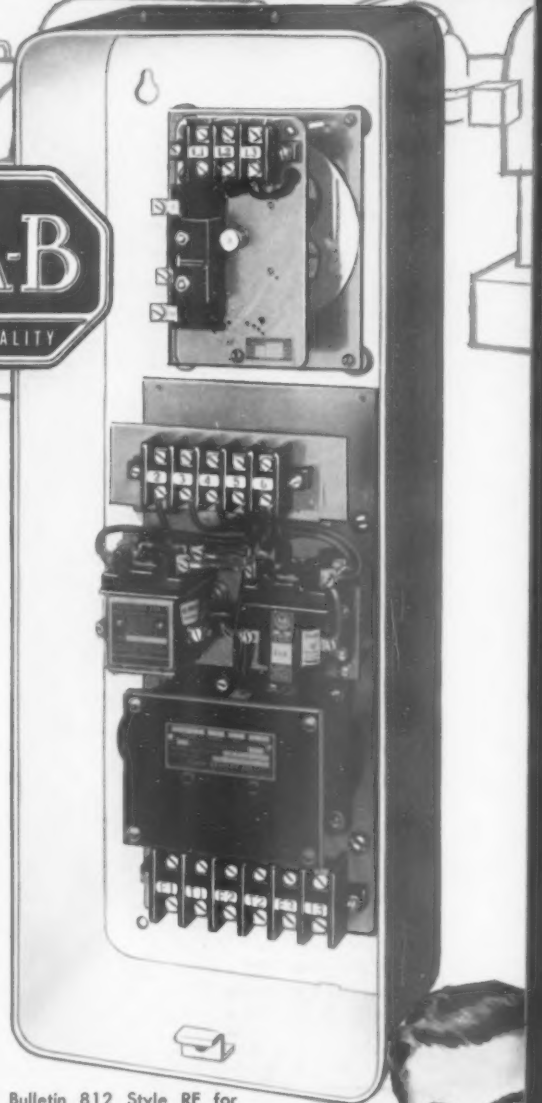
It's sound "economy" to guard your investment in expensive motors and equipment against the extensive damage that can result from a phase failure or phase reversal. Allen-Bradley's Bulletin 812 Style RF relay provides *complete, positive* protection against both of these hazards.

The Bulletin 812 Style F phase failure relay instantly detects *all* open phase conditions on a motor branch circuit and removes the motor from the line—yet is not subject to nuisance dropouts from transient line fluctuations. An unusual feature of this Style F relay is its positive response, regardless of motor load or type of motor branch circuit employed.

The Bulletin 812 Style R phase reversal relay disconnects the motor from the line—whether it is running or not—when a phase reversal occurs on the line side of the relay. Thus, it can be used to protect a single motor or a group of motors. Furthermore, the Style R relay removes the motor from the line should a phase failure occur while the motor is stopped.

All A-B Bulletin 812 relays are completely "fail safe." It will pay you to investigate this economical insurance against the heavy losses that can—and *frequently* do—result from phase failure and phase reversal. Write today!

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.
In Canada: Allen-Bradley Canada Ltd., Galt, Ont.



Bulletin 812 Style RF for Phase Failure and Phase Reversal consists of Style F Phase Failure and Style R Phase Reversal relays in the same enclosure.

Bulletin 812 Style F for Phase Failure

Bulletin 812 Style R for Phase Reversal

B-40-818

ALLEN-BRADLEY

Member of NEMA

Quality Motor Control

Put materials handling on a PRODUCTION LINE BASIS with a UNIT-COLES mobile crane

This 12-ton Model S-1210 mobile crane is moving tractor parts from trailer to storage area at the International Harvester Plant, Chicago.

WORLD'S SAFEST CRANE

One of many UNIT-COLES safety devices is this safe load indicator which automatically warns operator of dangerous load condition, then instantaneously "stops and holds" boom and load-hoist motions.

Mounted on a self-propelled carrier, a UNIT-COLES mobile crane travels quickly, indoors or outdoors, from one end of the plant to the other . . . handles materials flow from start to finish with production line efficiency. A cantilever-type boom gives *this crane* lower-than-usual overall height, making it ideal for in-plant operation and for unloading or loading motor or rail carriers. Tail swing and turning radius are shortest of any full-circle revolving crane, providing easy maneuverability in congested areas. Instinctive "left-for-left" and "right-for-right" steering, regardless of direction cab is facing in relation to chassis, *plus* independent swing and travel, simplifies travel along narrow aisles.

Load-hoist, swing, and boom-hoist are independently powered by separate electric motors with an infinite range of speeds. At the touch of a lever the operator raises or lowers a load quickly, or inches it so slowly that it barely appears to move. And, with boom-hoist independent, he can boom up or down during swing without pausing.

Operating a UNIT-COLES is really simple — no gears to shift, no clutches to move. Inexperienced men have become competent operators within a few hours. The man in the cab feels safe and secure, too, knowing that his UNIT-COLES is fitted with exclusive safety devices like the automatic safe load indicator, self-resetting limit switches on load-hoist and boom-hoist, and fail-safe automatic braking, with "dead man control", on all crane motions.

UNIT-COLES mobile cranes are available in capacities from 5 to 50 tons and with a wide range of versatile lifting attachments. For details and the name of your nearest dealer, write today.

UNIT

UNIT CRANE & SHOVEL CORP.

6706 W. Burnham Street
Milwaukee 19, Wisconsin

9:47 A.M. Customer phones order to District Office.

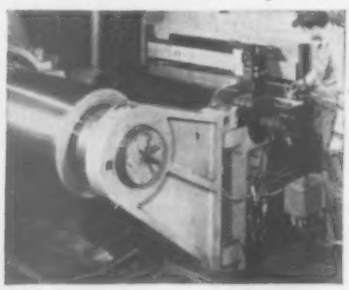
10:01 A.M. Customer's tape for the item is pulled from file. There are 10,000 customer tapes in a typical District Sales Office. Only variables are typed on re-orders.

10:30 A.M. The Cleveland Teletype Switching Center automatically relays the order to the proper service center.

HOW REPUBLIC'S NEW "MINUTE MAN"

How Republic's High Speed Communication System Helped Three Customers

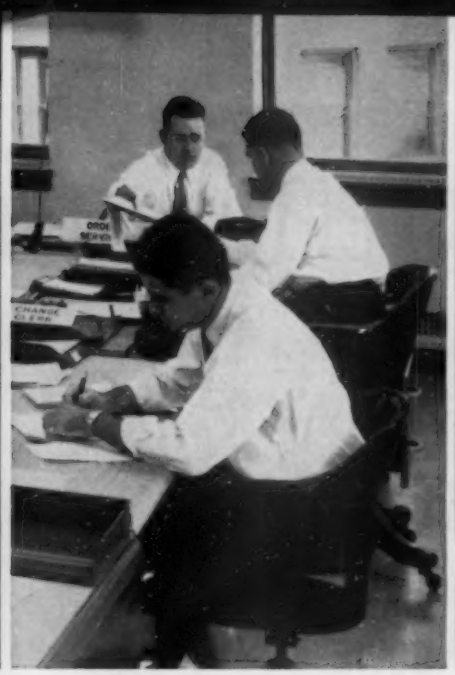
Tulsa ordered at 10:00 A.M. and Chicago shipped at 5:00 P.M. the same day. A customer's inquiry from Tulsa for oil country casing and tubing was teletyped to Cleveland at 10:07. Cleveland located the material in stock at the Chicago mill and answered the inquiry at 10:15. Forty-five minutes later the order was confirmed. The order was shipped from Chicago by 5 o'clock that same day. Just one example of how Republic's sales and production teams are keyed to solve customers' delivery problems.



"Need stainless steel in quantity, and need it in a hurry", a sink manufacturer phoned our Chicago Distributor. Approximately forty-five hours after the phone call, Republic's Massillon mill had the order of ENDURO® Stainless Steel rolled, slit, shipped, and in the customer's plant. An unusual instance? Perhaps, but it does show again, how Republic's high-speed communication system is geared to keep pace with industry's growing demands for service and quality.

From inquiry to delivery within two days. A Detroit forging customer needed hot rolled bars quickly, to fill an order. Within minutes after the inquiry, the Cleveland service center located steel billets in semi-finished form at the Buffalo steel plant. Result—the Buffalo mill received the order in detail the same day of the inquiry. The bars were rolled that night and shipped the next day. Now, knowledge of Republic mills is concentrated and available to customers within minutes.

For more facts Circle Reader Service Card numbers as follows: 697 Casing and Tubing 698 Stainless Steel



10:38 A.M. A team of service center "Minute Men" quickly selects the right mill to satisfy the customer's specified quality and delivery.

11:30 A.M. Mill receives order containing metallurgy, shipping instructions, and all details.

SERVICE SPEEDS STEEL DELIVERIES

Fast delivery is always a point of competition among steel mills. Republic now applies automation to cut order processing from days to minutes: it reduces paper work and production time—speeds delivery. This increase in service gives Republic customers another competitive edge in today's market.

From the first click of the teletype key, Republic's sales and production teams go to work. Within a matter of seconds, customer orders can be sent from any one of 22 district sales offices to the Cleveland Switching Center. Here orders are relayed automatically to any one of six service centers where a team of Republic "Minute Men" check specifications, confirm orders, and determine mill schedules. Once the order has been processed at the service center, it is relayed automatically to the proper mill for scheduling—all in a matter of a few hours.

Installed after three years of research and development by Republic, this electronically-automated system has literally revolutionized methods and organization for processing sales orders.

In addition to speedier handling, customer specifications are filed on paper tapes for repeat order use. The possibility of error is reduced and duplication of records eliminated.

"Minute Man" service on steel deliveries is only the first step of a comprehensive program. Research and planning is under way to extend the automatic system of scheduling and processing within the plant. A battery of electronic brains will provide the statistical information needed to plan and control operations more efficiently.

Automation is but one example of Republic's continuous effort to improve customer service.

REPUBLIC STEEL

World's Widest Range of Standard Steels and Steel Products

REPUBLIC STEEL

REPUBLIC STEEL CORPORATION
DEPT. FA -8112
1441 REPUBLIC BUILDING • CLEVELAND 1, OHIO

Please send me more information on:
☐ Casing and Tubing ☐ Stainless Steel

Name_____ Title_____

Company_____

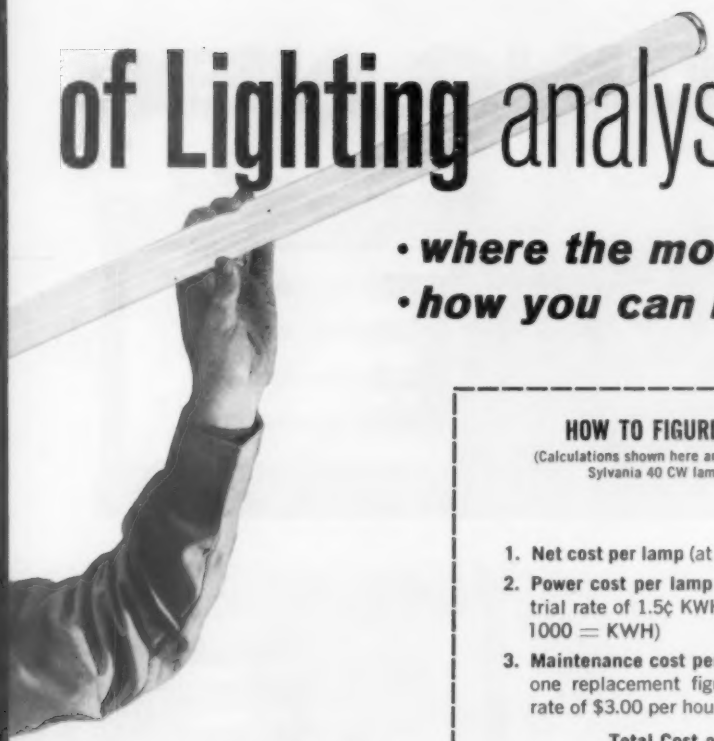
Address_____

City_____ Zone____ State_____

If you just figure the cost of lamps you only know about 1/10th of the story!

Only a **Total Cost**

of Lighting analysis can show



- ***where the money really goes***
- ***how you can really cut expenses***

HOW TO FIGURE YOUR TOTAL COST OF LIGHTING (TCL)

(Calculations shown here are based on the average 7500-hour operating life of a standard Sylvania 40 CW lamp which requires 46 watts of power including ballast.)

	National average per lamp	Put your costs here
1. **Net cost per lamp** (at average discount of 35%)	$ .81	
2. **Power cost per lamp** based on average industrial rate of 1.5¢ KWH (watts × 7500 hours ÷ 1000 = KWH)	5.18	
3. **Maintenance cost per lamp** (one cleaning plus one replacement figured at average industry rate of $3.00 per hour)	2.00	
Total Cost of Lighting (TCL) per lamp	7.99	
TCL for 100-lamp installation	$799.00	
(Note: If you use 100 Sylvania lamps, figure the 8% extra lighting value of 8 lamps over 100 ordinary lamps.*)	× .08	
Saving through extra Sylvania lighting value*	$ 63.92	

*These are the extra dollars you would have to spend per 100 ordinary lamps to get the equal lumen hours of light you get from Sylvania.

Sylvania is so sure savings will result from figuring this way, we'll even send our representative to show you how (or you can do it here — now!)

With cost of lamps amounting to only about 10% of your *T*otal *C*ost of *L*ighting (TCL), why should Sylvania be so interested in this new over-all way of figuring? Two good reasons:

First, because TCL best demonstrates the over-all superiority of Sylvania fluorescents.

Second, because we believe that just in figuring TCL you'll discover a number of new opportunities for shaving costs. And that's one of the things we like to help you do.

What *is* your TCL? Cost of lamps *plus* power *plus* maintenance. Add cost of fixtures, too, if you're remodeling.

WITH TCL ANALYZER, a Sylvania representative can figure in minutes how the special conditions in your plant affect Total Cost of Lighting.

Our representative can help figure special conditions in your plant. With his Analyzer Kit, he can do it in minutes, give you a complete lighting analysis *free*.

He can also show you how and why, for every penny you spend for lamps, power and maintenance, you get more value with Sylvania.

And he'll show how Sylvania backs its claims to lowest TCL with an *exclusive* Light Insurance Policy. *Guarantees* Sylvania fluorescents will perform better *in your own opinion* than the brand you are now using—or your money back!

Call your Sylvania representative. Or write us: Sylvania Lighting Products, a Division of Sylvania Electric Products Inc., Dept. 24, 60 Boston St., Salem, Mass. In Canada: Sylvania Electric (Canada), Ltd., Box 2190, Station "O," Montreal 9.

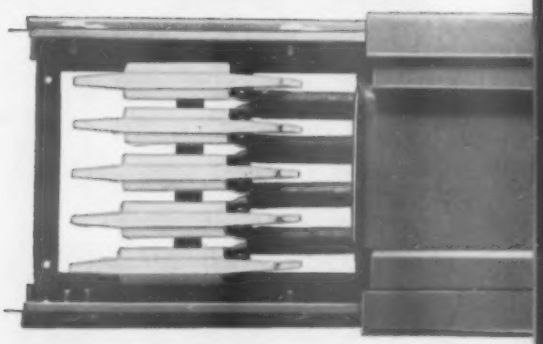
EXCLUSIVE SYLVANIA LIGHT INSURANCE POLICY is your guarantee of lowest TCL—or your money back!

SYLVANIA

Subsidiary of **GENERAL TELEPHONE & ELECTRONICS**

For more facts Circle 725 on Reader Service Card

INTRODUCING NEW



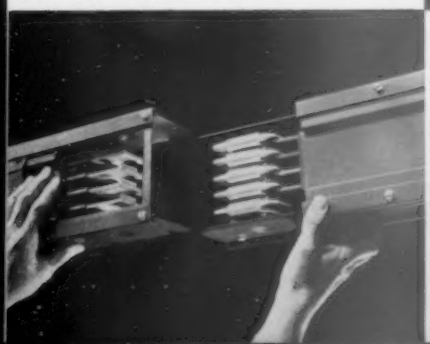
The safest, fastest-to-install plug-in duct ever designed!

Now BullDog, the originators of Bus Duct systems, gives you new safety for plant personnel plus new installation speed and economy with new XL BUStribution duct! Completely Butyl covered aluminum bus bars give true dead-front construction. Crews can now install more duct in a day than ever before. Superior engineering provides low voltage drop . . . down to half that of other plug-in duct systems . . . plus unexcelled short circuit rating. BullDog gives you completely engineered fittings. You can get everything you need from a single source —your local BullDog distributor. Call him—he'll give you a demonstration of all the XL safety and installation features.

For more facts Circle 701 on Reader Service Card

FAST INSTALLATION

Keyed bus ends align themselves positively, instantly, without fumbling or wasted time. You can position sections as fast as you can handle them!



EASY INSTALLATION

This one integral bolt locks POSITIVELY . . . holds keyed bus ends under a ton of pressure. The fully insulated bolt spins tight *fast*. Joints stay locked!

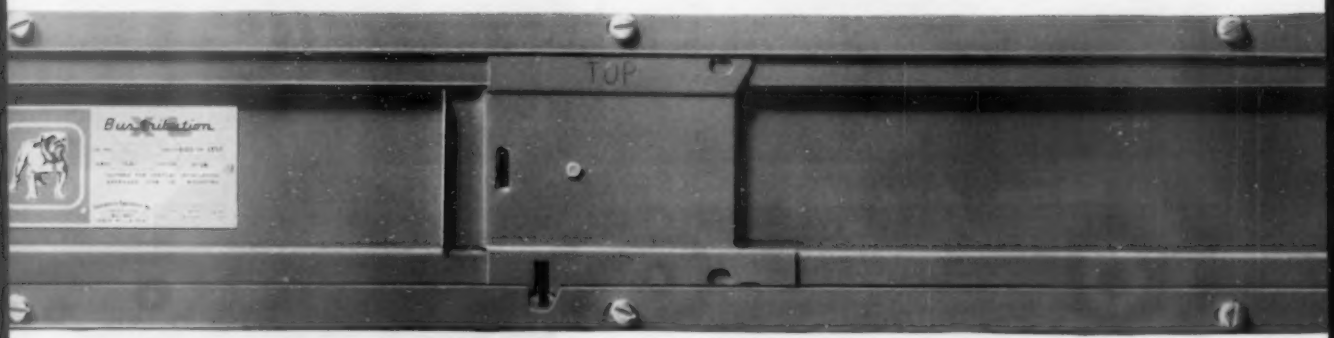
ECONOMICAL INSTALLATION

You need only half as many hangers as usual. Ten-foot supporting spans cut number of hangers *and the time needed to install them* by 50%.

BULLDOG

XL

BUStribution® DUCT



The new **XL SAFETY-PLUG** is faster, safer to use than any other plug!

XL Safety-Plug has new, simplified design. You can plug-in on XL duct in seconds. It has safety features not found on any other plug. Plugs are available which prevent installation or removal when plug handle is in the "on" position. You can plug in from either side of the duct, in all duct sizes from 225 through 1000 amps. You can use all plug-in openings at the same time, if desired.

When you see your BullDog distributor about XL dust, examine the Safety-Plug he has on display, too. Here's an electrical team you can depend on to do the job better in every way!

BullDog Electric Products Div., I-T-E Circuit Breaker Co., Box 177, Detroit 32, Mich. In Canada: 80 Clayson Rd., Toronto 15, Ont. Export Div.: 13 East 40th St., N.Y. 16, N.Y.

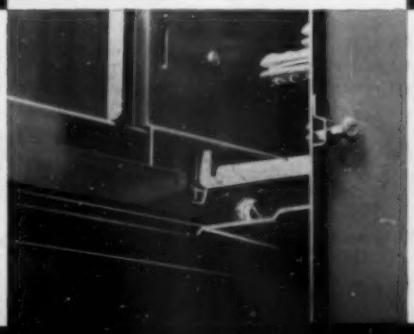
BULLDOG ELECTRIC PRODUCTS DIVISION
I-T-E CIRCUIT BREAKER COMPANY

DEAD-FRONT SAFETY

Each bus bar has full-length Butyl insulation, even in bus plug openings. XL BUStribution Duct is the world's safest duct to plug into, to work around.

PERSONNEL SAFETY

Safety door covers the opening . . . slides back when safety interlock finger is in position. Plug cannot be removed or installed when safety door is open.

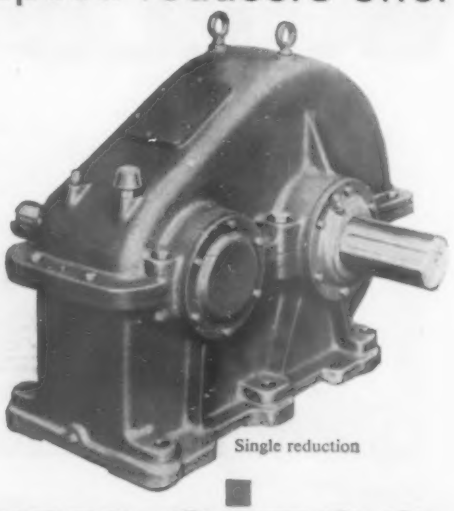


EQUIPMENT SAFETY

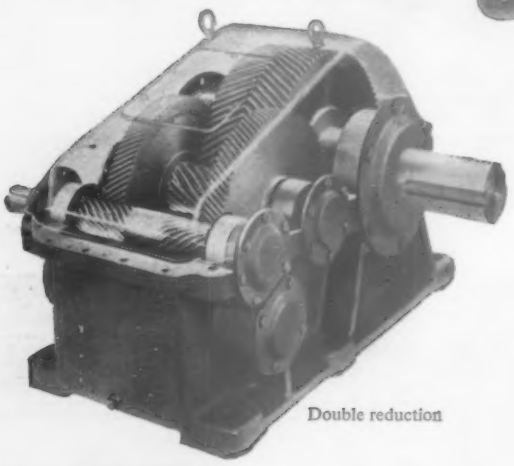
SAFETY PLUGS cannot be installed or removed when in the "on" position . . . exclusive design positively protects against arcing, safeguards equipment.

NOW Link-Belt parallel shaft speed reducers offer

new design



Single reduction



Double reduction

new sizes

new ruggedness

Triple reduction

reduce drive costs by matching drive size to horsepower requirements with 35% more sizes

New design—Herringbone or double helical gears arranged in new "balanced" design permit high horsepower, high ratio reduction in a sturdy, compact housing.

New sizes—Now 18 sizes each of double and triple reduction units; 17 single. Drive selections closely match hp requirements, with a corresponding reduction in drive costs. Available to 2800 hp, ratios to 292:1.

New ruggedness—Rigid, ribbed housing keeps parts accurately and permanently aligned even under grueling operating conditions involving heavy shock loads, and temporary overloads.

For complete information call your nearby Link-Belt district sales office or authorized stock-carrying distributor. Ask for Book 2719.

OUTSTANDING FEATURES

- Grease-lubricated seals.
- Positive splash lubrication supplies ample flow of oil to all moving parts.
- High-capacity spherical roller bearings for maximum loading.
- Gears of hardened, precision alloy steel. Double helical or herringbone design.
- New, built-in backstop.
- Exceptional wearing qualities in accurately machined low-speed shafts of heat-treated carbon steel; intermediate shafts of chrome-molybdenum steel.
- Cast iron housing maintains permanent, accurate alignment of all parts.

LINK-BELT

SPEED REDUCERS

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Warehouses, District Sales Offices and Stock Carrying Distributors in All Principal Cities. Export Office, New York 7; Australia, Marrickville (Sydney); Brazil, Sao Paulo; Canada, Scarboro (Toronto 13); South Africa, Springs. Representatives Throughout the World. 19.364

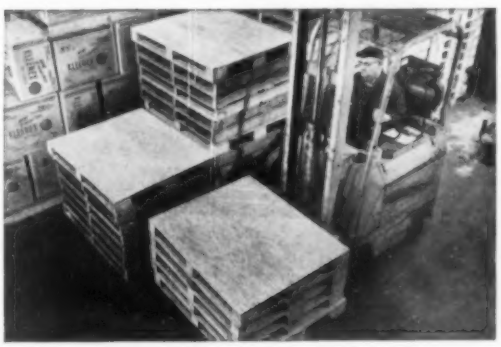
For more facts Circle 702 on Reader Service Card

A REPORT TO MANAGEMENT ON HOW

Industry cuts costs with FIR PLYWOOD

ROUTE TO:
- ☐ ENGINEERING
- ☐ PRODUCTION
- ☐ SALES
- ☐ PURCHASING
- ☐ MAINTENANCE
- ☐ CONSTRUCTION
- ☐ _____

Fir plywood building components cut costs and speeded construction of this 50,000-sq.-ft. International Paper Co. plant, Auburndale, Fla. Giant plywood box girders support stressed skin roof panels, which incorporate ceiling, framing and roof decking. Panels are paired to form a peaked roof over each 40′ bay, providing large clear floor areas. Exterior walls are overlaid fir plywood, which needs no finish and virtually no maintenance. Construction with light, strong, prefabbed plywood components kept over-all costs to $7.54 psf. The entire structure was completed in only 154 working days.



Switch to plywood from lumber for pallets at West Coast Grocery Co., Tacoma, Wash., has greatly reduced repair and replacement costs. Plywood is smooth, splitproof, splinter-free; nails can't work loose. Easily damaged merchandise gets maximum protection.

Plywood ducts exposed to corrosive chemical wastes at this cellophane plant have required no maintenance in over four years. Exhaust manifolds remove air laden with sulfuric acid mist, hydrogen sulfide, other chemicals and water vapor. Plywood used is high density type, which has a smooth, hard surface, requires no paint or other protection, and is virtually impervious to moisture and most acids and other chemicals.

FOR MORE INFORMATION about fir plywood—its uses, properties and advantages—write

DOUGLAS FIR PLYWOOD ASSOCIATION

TACOMA 2, WASHINGTON

—an industry-wide organization devoted to research, promotion and quality control

Always specify by DFPA grade-trademarks

DFPA TESTED QUALITY

Yale midget king

link chain hoists are the newest development in the full line of Yale lightweight electrics. The versatile Midget King lets the operator pick up material not directly under the hoist itself because the durable alloy type link chain flexes in any plane. Easy to move and store, the Midget King can be operated for less than two cents a day. Hook or trolley models are available, in capacities of ⅛, ¼, ½, 1 and 2 tons.

Hoist-and-load protecting upper and lower limit stops plus two brakes provide positive safety. Hardened alloy steel gears assure lengthy, economical service. Roller chain models of the Midget King are also available. The complete line of Yale hand, air and electric hoists is ready for you — to accomplish any overhead handling task.

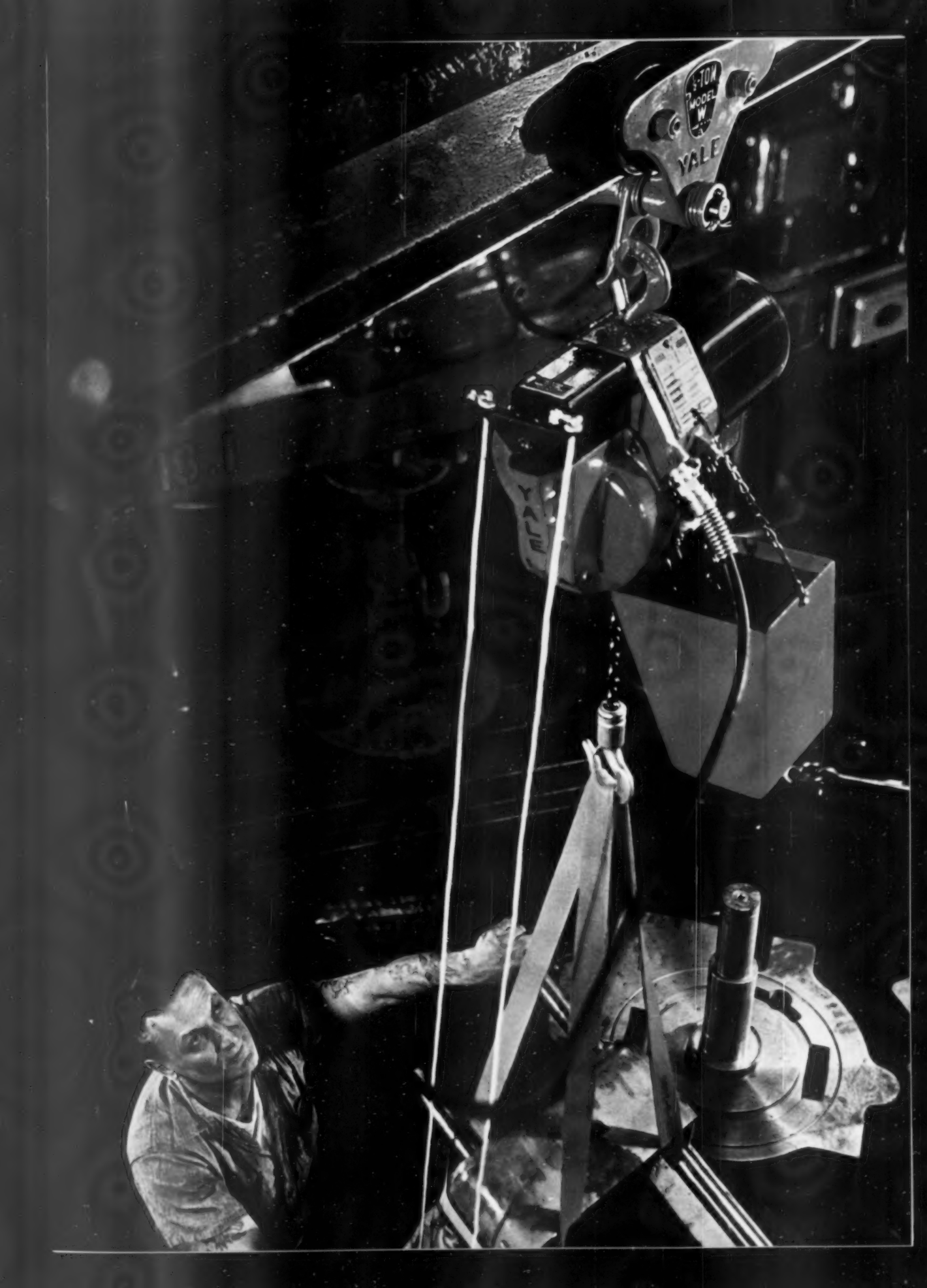
Contact your Yale distributor listed under "Hoists" in the Yellow Pages of your phone directory. Or write for brochure #577H to The Yale & Towne Manufacturing Co., Yale Materials Handling Div., Phila. 15, Pa., Dept. MH2.

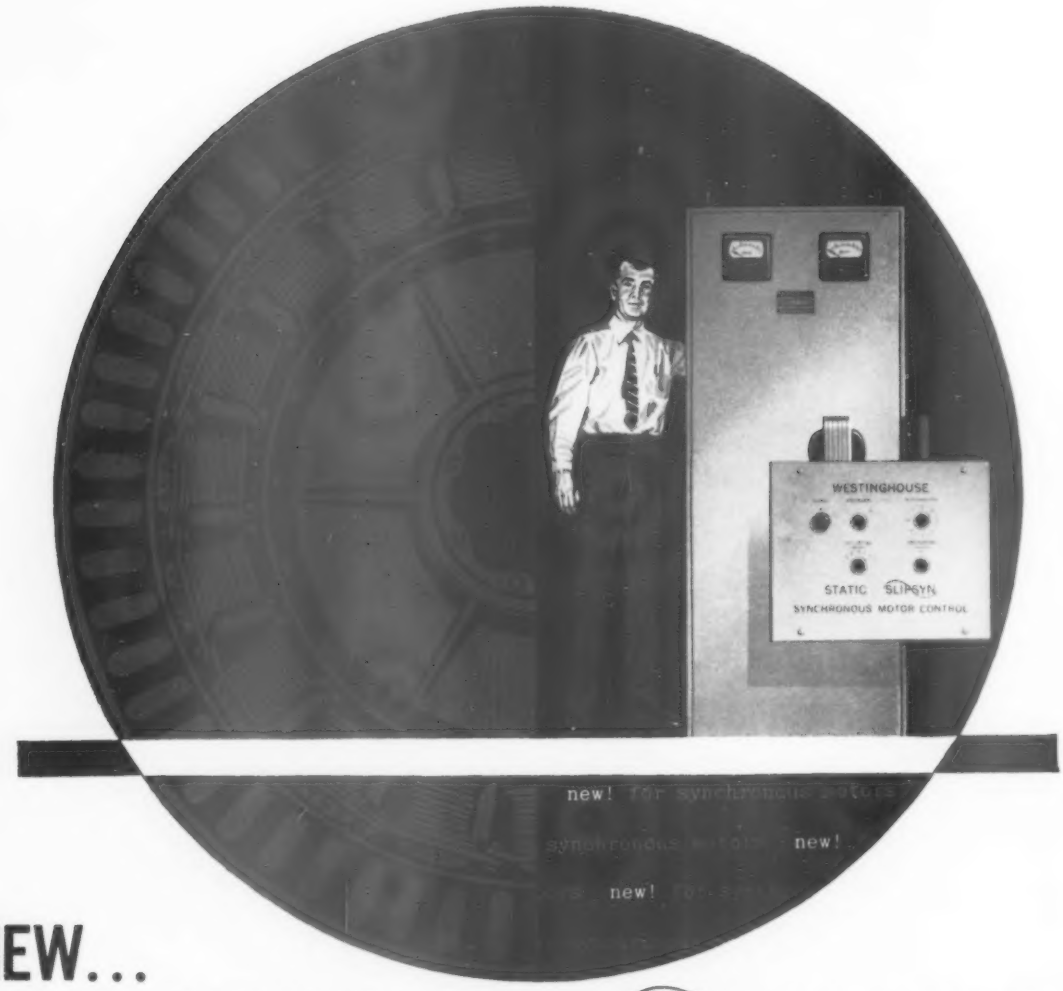
Yale Materials Handling Division, a Division of The Yale & Towne Manufacturing Company. Manufacturing Plants: Philadelphia, Pa., San Leandro, Calif., Forrest City, Ark. Products: Gasoline, Electric, Diesel and LP-Gas Industrial Lift Trucks Worksavers · Warehousers · Hand Trucks · Industrial Tractor Shovels Hand, Air and Electric Hoists.

YALE®

INDUSTRIAL LIFT TRUCKS
TRACTOR SHOVELS · HOISTS

YALE & TOWNE


4-TON
MODEL
W
YALE



NEW... WESTINGHOUSE STATIC SLIPSYN CONTROL

UPS RELIABILITY, VIRTUALLY ELIMINATES MAINTENANCE

STOP PUZZLING over synchronous motor controls . . . here's the advanced way to gain top performance. The all-new Westinghouse Static Slipsyn® control pays its own way by chopping motor control maintenance costs, practically eliminating down time and increasing reliability. Check these advantages:

WESTINGHOUSE STATIC SYNCHRONIZING CONTROL has no moving parts. It uses simple, reliable, transistorized networks instead of conventional relays . . . no contacts, bearings and springs to corrode, wear and fail. Size and weight are greatly reduced — and Static Slipsyn control is immune to contaminated, dusty surroundings.

WESTINGHOUSE STATIC SYNCHRONIZING CONTROL precisely applies motor field excitation at proper speed and pole position up to and including 99% of synchronous speed. Pull-out protection is positive and adjustable to avoid false tripping.

FOR NEW AND OLD INSTALLATIONS. Your Westinghouse salesman will help you apply the completely packaged Static Slipsyn control to synchronous motor installations now being planned. And he can show you how static synchronizing control units can replace the conventional, mechanical relays in your present control enclosures. Either way, Westinghouse Static Slipsyn control saves big money through reduced maintenance, improved reliability, shorter down times.

Contact your local representative or write Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pa. J-25001

YOU CAN BE SURE... IF IT'S

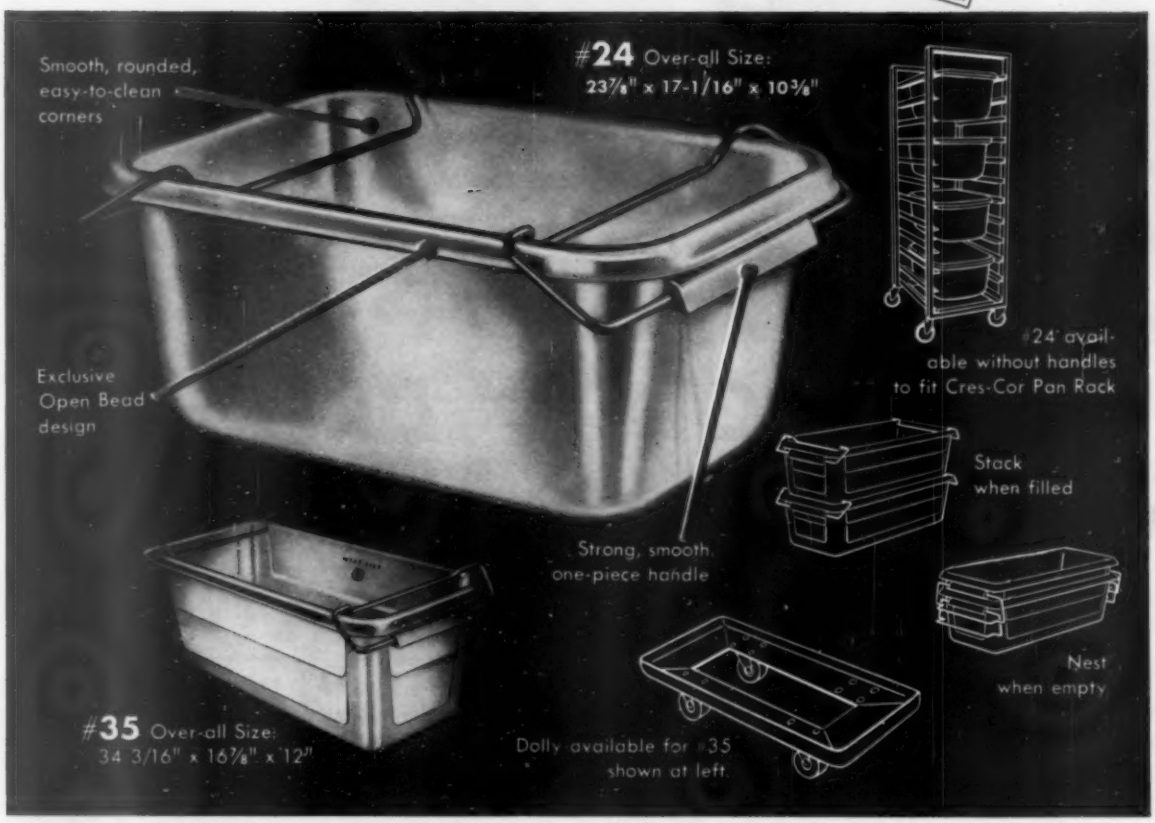
Westinghouse

WATCH "WESTINGHOUSE LUCILLE BALL-DESI ARNAZ SHOWS" CBS TV ALTERNATE FRIDAYS

now . . . handy smaller size . . . new features

Tote Boxes

by WEAR·EVER


Smooth, rounded, easy-to-clean corners
#24 Over-all Size: 23⅞" x 17-1/16" x 10⅜"
#24 available without handles to fit Cres-Cor Pan Rack
Exclusive Open Bead design
Stack when filled
Strong, smooth, one-piece handle
Nest when empty
#35 Over-all Size: 34 3/16" x 16⅞" x 12"
Dolly available for #35 shown at left.

You asked for it . . . a smaller version of the famous Wear-Ever #35 Tote Box. It's our new #24, shown at top in the above illustration, and it's available *now*.

We've designed it particularly for you whose needs call for a lighter, smaller, easier-to-handle container. It is available without handles, to fit perfectly in a Cres-Cor pan rack.

This new box incorporates the same quality construction features as our standard size box—special extra hard wrought Wear-Ever Aluminum Alloy, sanitary open bead and extra strong, double-embossed bottom.

Like its big brother, shown in the smaller photo, this new box stacks when full, nests when empty and is available with your identifying imprint on side or end, if desired.

For full information on our complete line of food handling items, call your local Wear-Ever man, or send coupon below.

WEAR·EVER ALUMINUM UTENSILS

WEAR-EVER ALUMINUM, INC.
WEAR-EVER BLDG., NEW KENSINGTON, PA.

Wear-Ever Aluminum Inc.
6812 Wear-Ever Bldg., New Kensington, Pa.

GENTLEMEN: *I'd like to know more about your Tote Boxes and other handling equipment.*

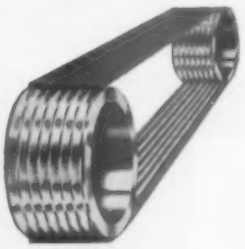
☐ Send me your catalog. ☐ Have your representative see me.

NAME .....

TITLE .....

Fill in, clip to your letterhead and mail today.

NEW IDEA! *Wear-Ever's new Nickel Scouring Cloth. Won't scratch, won't mar, far outlasts ordinary scouring cloths. At your dealer's.*



- *NO MATCHING PROBLEMS*
- MAINTAINS GROOVE SHAPE
- COMPLETE CONTACT-PRESSURE
- CONSTANT PITCH AND SPEED RATIOS
- LESS MAINTENANCE—LESS TAKE-UPS
- LESS BELT AND SHEAVE WEAR

Write for Bulletin M141

R/M POLY-V® DRIVE

MORE POWER...*in Less Space*
WITH MORE RELIABILITY

Designed for high volume forgings, this giant 2500 ton automated press developed by Erie Foundry Company is powered by a 250 HP Poly-V Drive. This new drive provides much higher horsepower capacity . . . delivers more dependable power per inch of drive width than ever before possible! Poly-V features a single unit V-ribbed belt across full width of the drive sheave—not an assembly of V-belts. Single unit belt design eliminates length matching problems — minimizes equipment down-time and belt replacement costs, runs cooler, smoother.

Just two cross sections of Poly-V Belt meet every heavy duty power transmission requirement. Ask your R/M Distributor for details about R/M Poly-V* Drive.

*Patented

WHEN YOU CHANGE DRIVES . . .
CONVERT TO POLY-V AND BE SURE!

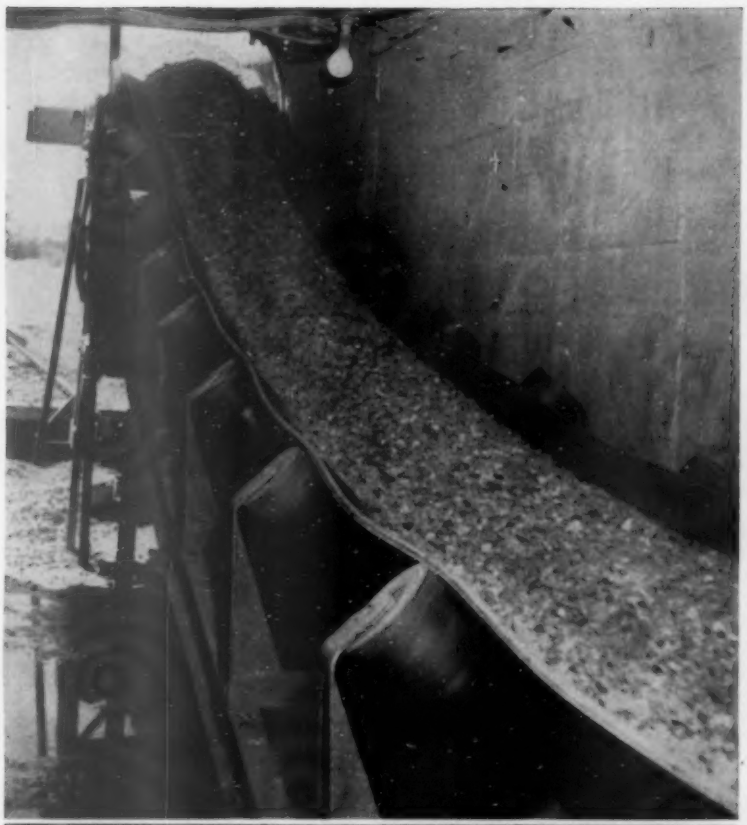
RM1030

RAYBESTOS-MANHATTAN, INC.
MANHATTAN RUBBER DIVISION, PASSAIC, NEW JERSEY

ENGINEERED RUBBER PRODUCTS . . . "MORE USE PER DOLLAR"

For more facts Circle Reader Service Card numbers as follows:

FACTORY

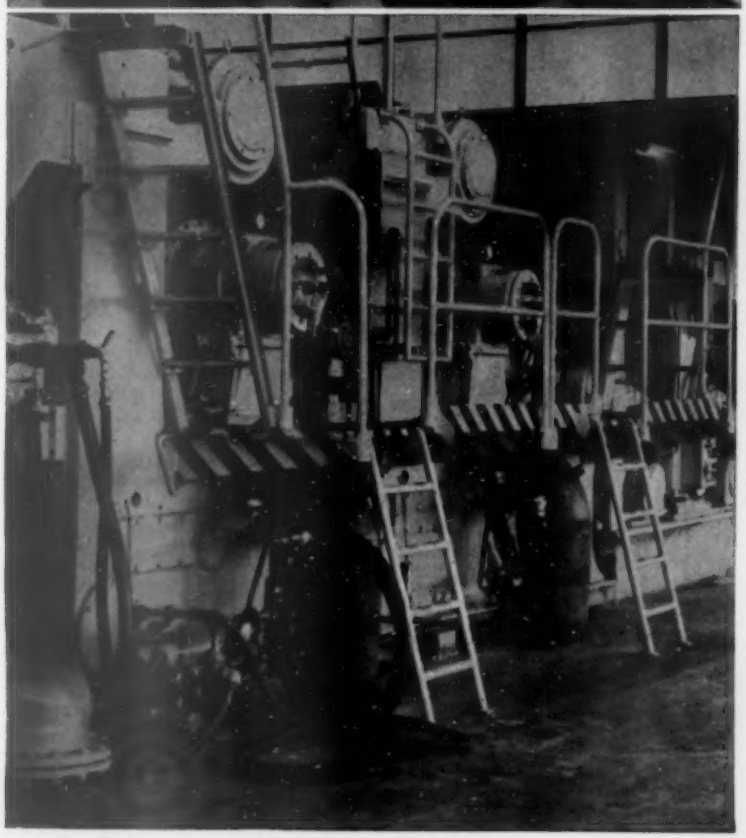


RAY-MAN CONVEYOR BELT

Engineered for 45° Idlers

- TRAINS NATURALLY
- TROUGHS DEEPLY
- HOLDS FASTENERS
- RESISTS IMPACT AND RIPPING
- REQUIRES NO BREAKER PLY
- DOUBLE COMPENSATION RELIEVES OUTER PLY STRESS
- EXCLUSIVE "XDC" LONG-WEAR COVER

Every component of a Ray-Man Conveyor Belt is *precision proportioned* to give you a balanced belt construction, with as much as ⅓ longer life expectancy. It's the same as getting ⅓ more conveyor belt for your money. Further savings are possible, if you use 45° Idlers. Properly engineered, you can haul a fuller load, or install a narrower conveyor. Ray-Man is guaranteed against ply or cover separation at the hinge line where the 45° angle proves too sharp for regular belt constructions. Write for Bulletin M303.

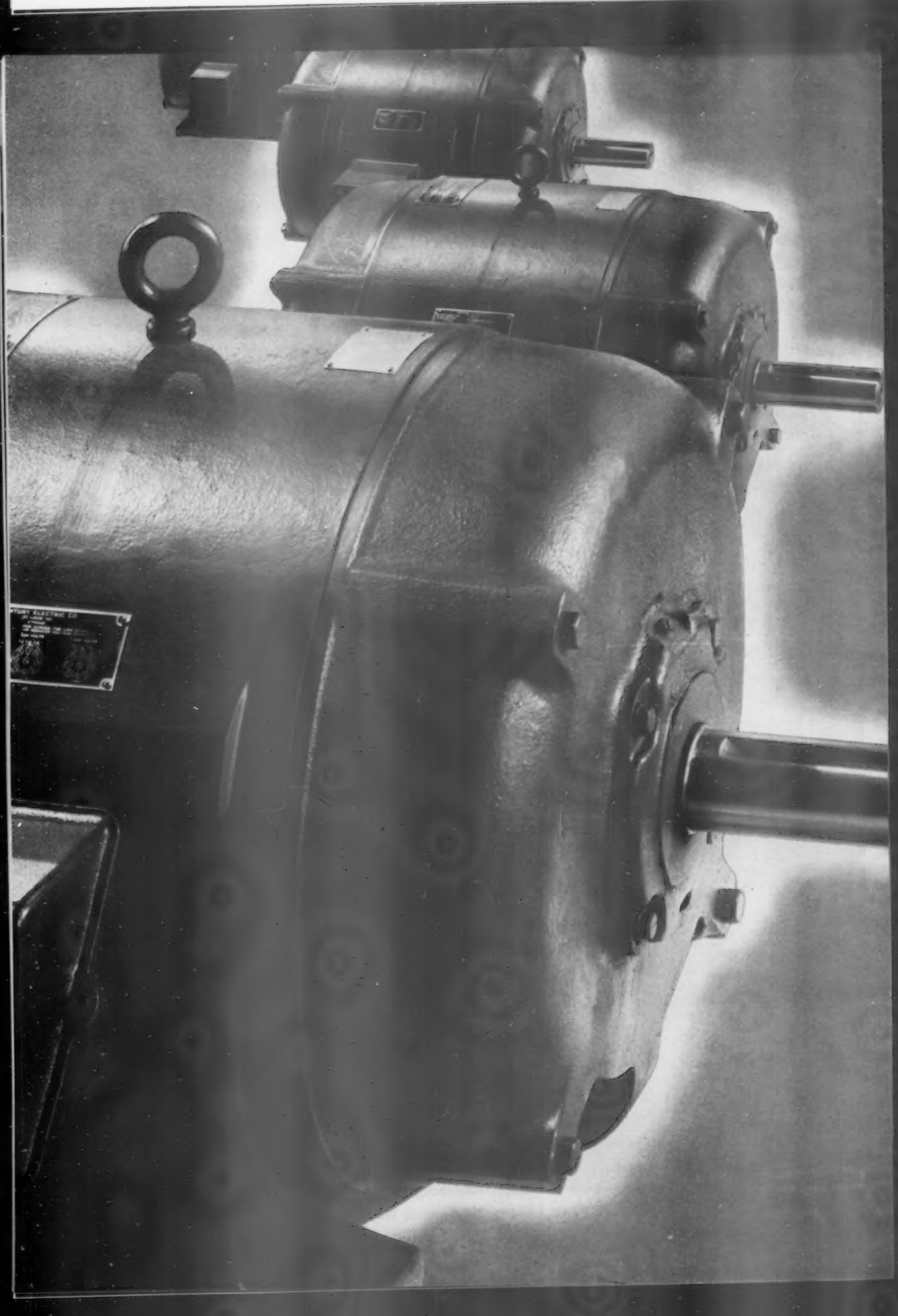


HOMOFLEX HOSE

more flexible, weighs less than any hose for equal pressure

- SUPER-STRONG
- PRECISION BUILT
- NO PRE-SET TWIST—WILL NOT KINK
- INSEPARABLE TUBE-TO-COVER BOND
- UNIFORM INSIDE AND OUTSIDE DIAMETERS
- EASIER, SAFER COUPLING

Strong, lightweight, and "flexible as a rope"—Homoflex is the easiest handling hose and lasts longer. Made in types for air, water, other fluids and gases. Ask about other types of R/M rubber hose for your job applications. Write for Bulletins M620 and M694.



Planning your electric motor needs

Experts predict a 75% rise in need for motors to drive air-moving equipment . . . other needs grow faster. Makes correct motor application more vital than ever before.

Take this one small segment of motor driven equipment—fans and blowers. Today the total installed horsepower is 15,000,000 . . . even the most conservative forecasters say that in 1965 it will be 26,000,000—a 75% increase. Horsepower requirements for allied equipment, such as compressors, blowers, unit heaters, air conditioners, refrigeration systems, and pumps, could rise even faster.

On typical new machine tools, motor horsepower has doubled since 1949. Means motors must be more efficient and reliable than ever before. When a production line shutdown can cost hundreds of dollars a minute, anything short of absolute reliability is a luxury most companies can't afford.

There are two things you can do about it: Get reliable motors. Get the right motor on each piece of equipment. Here's how Century Electric can help.

Application know-how—Century Electric makes motors and nothing but motors. Means that Century Electric application engineers know motor drive problems inside and out. They are vitally interested in your motor problems . . . vitally interested in helping you get the right answer.

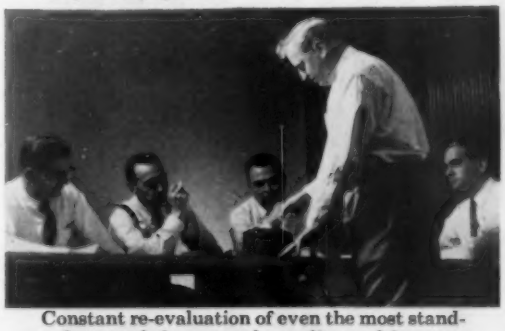
10,000 choices—Century Electric engineers don't have to rely on only a few types to do all jobs because Century makes over 10,000 types . . . from fractionals up to 400 hp. There is a right one for all equipment and operating conditions.

Reliable operation—Century Electric motors are built to take rugged use with a minimum of maintenance. Here are a few of the features that contribute to reliability and long life:

Tough insulation used in windings has great dielectric and mechanical strength, can resist severe heat shocks as well as resist dirt, dust and acids . . . rotors are precisely balanced to increase life and provide smooth, quiet operation . . . cast iron and steel frames can withstand tough abuse . . . extra coats of insulation dipped and baked on add years to the life of Century motors.

For more information please contact your nearest Century Electric Sales Office or Authorized Distributor. For details on Century's complete line of motors write for bulletin 270A, Century Electric Motor Application Guide. For *more* than just a motor . . .

From over 10,000 types of motors, application engineers can help you get the one that's best for your equipment.



Constant re-evaluation of even the most standard motor helps upgrade quality and improve performance.

Every motor is backed by a network of over 500 motor repair shops . . . your assurance of Century's continuing interest.

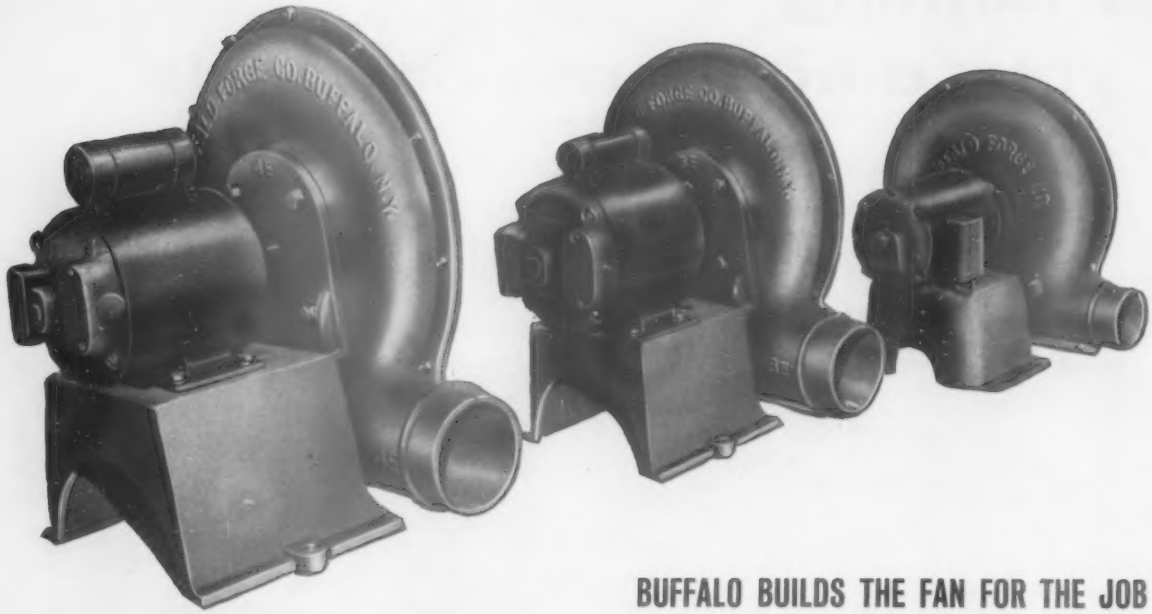
CENTURY ELECTRIC COMPANY

St. Louis 3, Missouri *Offices and Stock Points in Principal Cities*

Century

59-18

For more facts Circle 708 on Reader Service Card



BUFFALO BUILDS THE FAN FOR THE JOB

BLOWING • EXHAUSTING

FOR PRESSURIZED AIR APPLICATIONS Buffalo Type "E" Blowers are compact, husky units in 5 sizes up to 5500 cfm, for constant pressures up to 2 lbs., on direct-connected applications such as:

- Oil or gas furnace blowing
- Cupola blowing
- Gas line boosting
- Exhausting from grinding wheels
- A quality unit to put on equipment you sell.

A number of these efficient motor-driven units can provide power and installation savings over one large blower — plus flexibility of operation. For full details, write for Bulletin FMB-935.

FOR EXHAUSTING AIR OR MATERIALS Buffalo Industrial Exhausters are ruggedly built to handle the most punishing air or materials handling jobs. Their heavy steel plate housing is welded throughout. Wheels and blades are all-welded. Available in designs with heat slinger for moving hot gases (200° to 850° F.) — for handling corrosive fumes — or for moving abrasive or stringy materials such as emery dust, chips and shavings. Write for Bulletin FI-110 or consult your nearby Buffalo Engineering Representative about the complete line of Buffalo Fans for every air job in industry.

BUFFALO FORGE COMPANY BUFFALO, NEW YORK

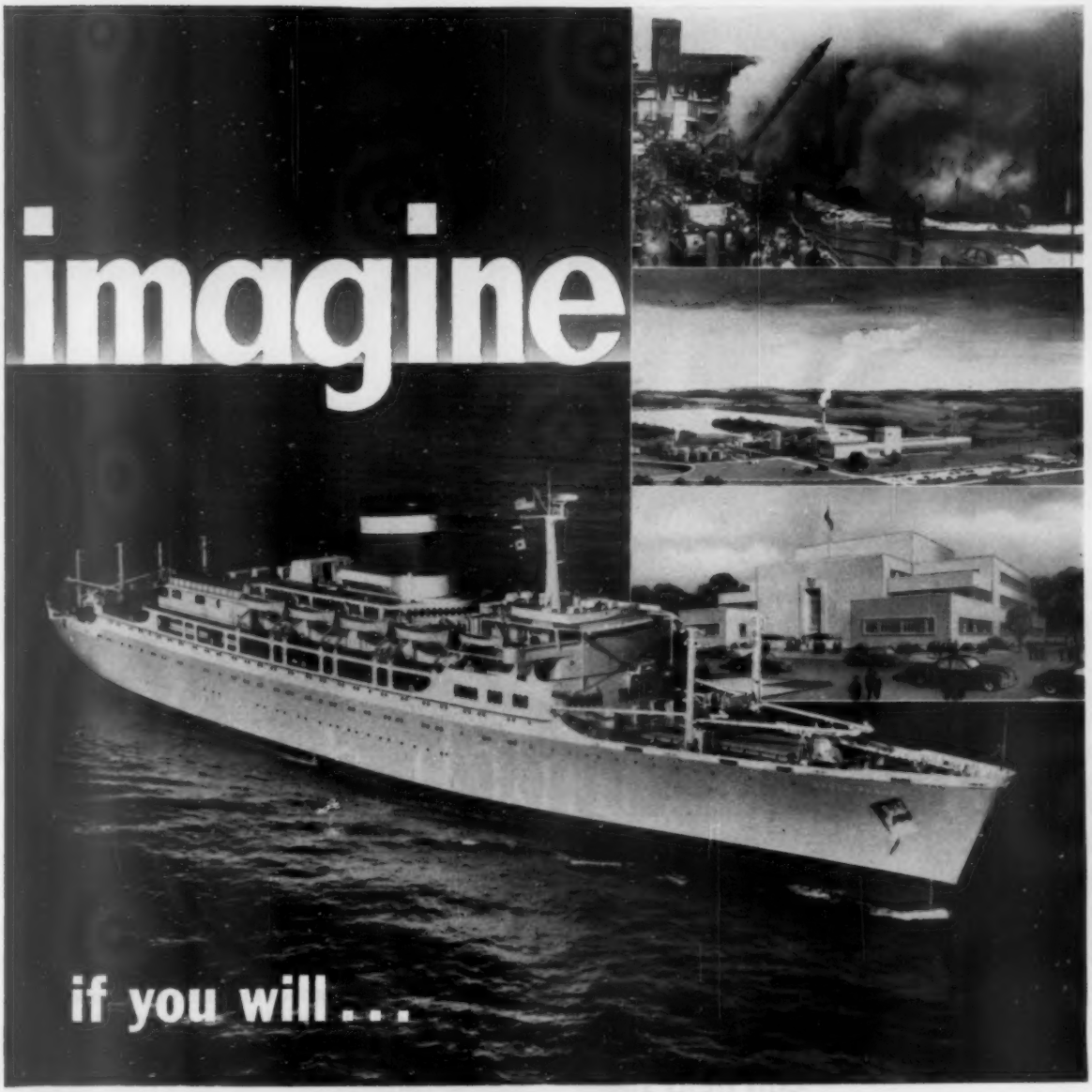
Buffalo Pumps Division • Buffalo, N. Y.

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

"Buffalo"

VENTILATING • AIR CLEANING • AIR TEMPERING • INDUCED DRAFT • EXHAUSTING • FORCED DRAFT • COOLING • HEATING • PRESSURE BLOWING

For more facts Circle 709 on Reader Service Card



the impossibility of operating our modern community without proper liquid moving equipment. Pumps of all types and sizes are operating 24 hours a day, moving the "life blood" of our social and business society.

Considering the necessity of reliable liquid handling in industry, we think you would find it advantageous to use "Buffalo" pumps for your important liquid handling jobs.

Your "Buffalo" Engineering Representative will be pleased to call at your convenience, or write direct for more information.

"BUFFALO" MAKES: Single Suction Pumps • Paper Stock Pumps • Fire Pumps • Sump Pumps • Chemical Pumps • Marine Pumps • Sewage Pumps • Double Suction Pumps • High Pressure Pumps • Heat Transfer Pumps • Close Coupled Pumps • Condensate Pumps

"Buffalo" PUMPS

BUFFALO PUMPS DIVISION OF BUFFALO FORGE COMPANY

471 Broadway, Buffalo, N. Y.

Canada Pumps, Ltd., Kitchener, Ont. • Sales Representatives in all Principal Cities

HYDRAULIC INSTITUTE U.S.A.

A BETTER CENTRIFUGAL PUMP FOR EVERY LIQUID

For more facts Circle 710 on Reader Service Card

Where so much depends on so little

ROLLWAY Field Engineers can help solve thorny replacement bearing problems

When production grinds to a halt due to roller bearing failure – in *any* machine or equipment – call in your Rollway Bearing Field Engineering Representative. He is available through your nearest Authorized Rollway Distributor.

Every Rollway Field Engineer is a bearing specialist, fully qualified to make recommendations on the spot. You will find he knows his business, *and yours,* when it comes to cylindrical roller bearings.

After his analysis of your particular problem, you can ordinarily get whatever replacement bearing is needed, right from the Rollway Distributor's stock. Your machines start rolling again. A minimum of delay . . . a maximum of service.

● *Ask your bearing distributor man for a copy of the Rollway product line bulletin. Rollway Bearing Co., Inc., Syracuse, N. Y.*

You can depend on

ROLLWAY®

BEARINGS

ENGINEERING OFFICES:

Syracuse • Boston • Chicago • Detroit • Toronto
Pittsburgh • Cleveland • Seattle • Houston
Philadelphia • Los Angeles • San Francisco

For more facts Circle 711 on Reader Service Card

For more facts Circle 712 on Reader Service Card ➤

Deepfreeze Appliances, Division of Motor Products Corporation. Glazed with approximately 10,000 sq. ft. Hammered Coolite, Glare Reduced on pattern side only. Design and construction by The Austin Company. Waukegan Glass Company, Waukegan, Illinois, Glazing Contractor.

IN *Better* BUILDINGS EVERYWHERE

Today's leading architects are taking fullest advantage of translucent glass. As a result, their outstanding buildings enjoy more and better daylighting per glazing dollar. And figured glass promotes truly functional architecture adapted to today's needs . . . offers a dramatic texture that enhances the appearance of any structure.

Cutler-Hammer, Inc., Lincoln, Illinois. Another award-winning structure in which 13,500 sq. ft. of Coolite, Glare Reduced one side has been installed to daylight adequately the plant of this pioneer electrical manufacturer. Design and construction by The Austin Company.

Square D Company Plant on Goodhope Road, Glendale, Wisconsin. 240 lights of 30" x 60" Coolite Heat Absorbing Glass are glazed around the top rim of the building. Architect: Grassold-Johnson & Assoc., Milwaukee, Wisconsin. Glazing: Pittsburgh Plate Glass Company, Milwaukee, Wisconsin.

SEE OTHER SIDE
for full color photographs of recommended industrial patterns

MISSISSIPPI GLASS COMPANY

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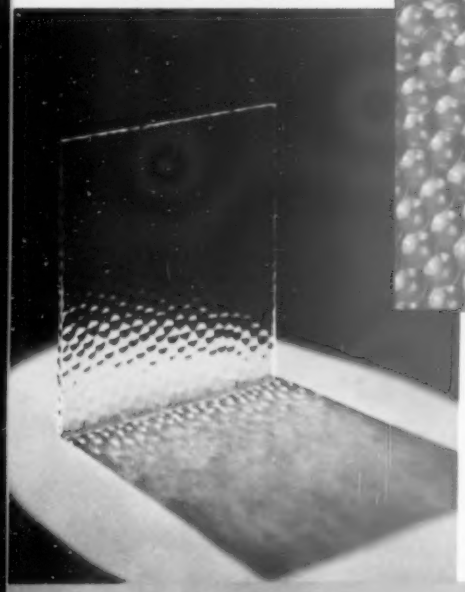
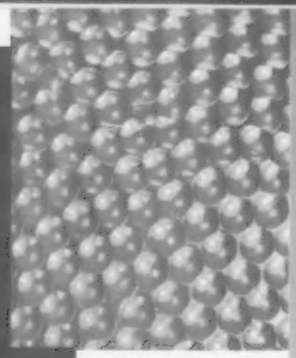
NEW YORK • CHICAGO • FULLERTON, CALIFORNIA

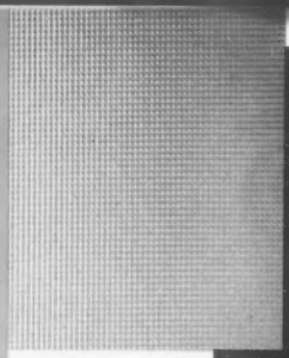
HAMMERED





PATTERN ACTUAL SIZE

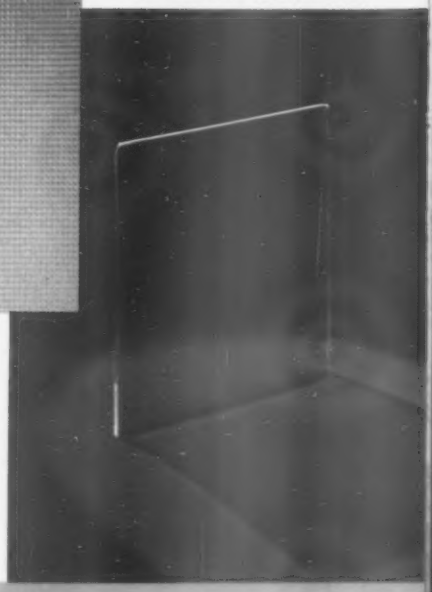
Available in thicknesses of ⅛", 7/32", and ¼" wired (Hexagonal Mesh)—also ¼" Misco (wired) untreated or glare reduced on one or both sides.



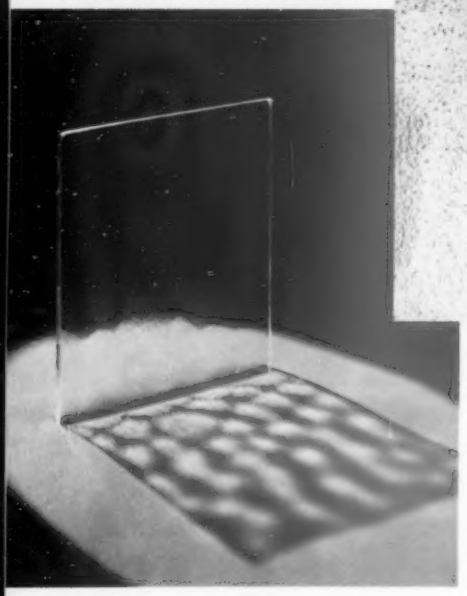
PATTERN ACTUAL SIZE

Available in thicknesses of ⅛", 7/32", and ¼" wired (Misco Wired only). Untreated or glare reduced on one or both sides.

FACTROLITE



SMOOTH ROUGH®



PATTERN ACTUAL SIZE

Available in thicknesses of ⅛", 7/32", ⅜", and ¼" wired (Hexagonal mesh on Pacific Coast only)—also ¼" Misco (wired) untreated or glare reduced on 2 sides only.

PATTERN ACTUAL SIZE

Available in thicknesses of ⅛", 7/32", and ¼" wired (Hexagonal Mesh). Untreated or glare reduced on one or both sides.

PENTECOR

For utility, beauty, and variety unmatched by any other glazing medium, specify Mississippi Glass. Available in a wide variety of patterns, wired and unwired, at better distributors everywhere.

MISSISSIPPI GLASS COMPANY

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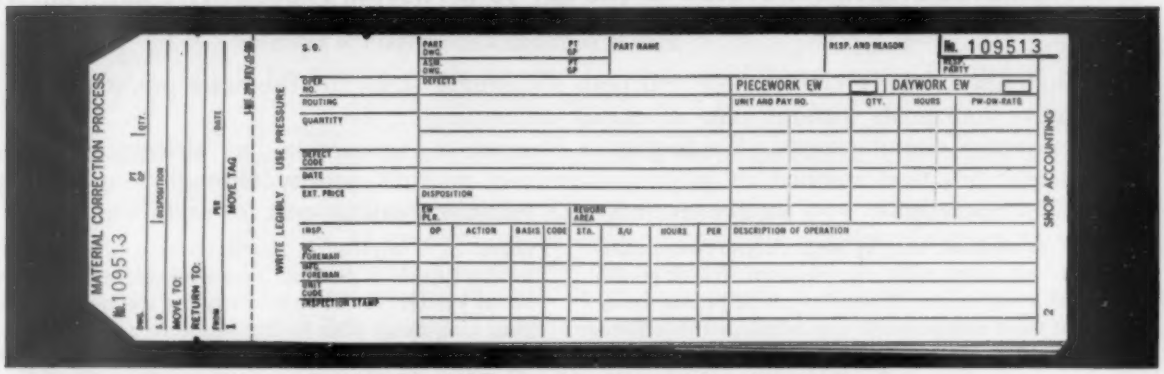
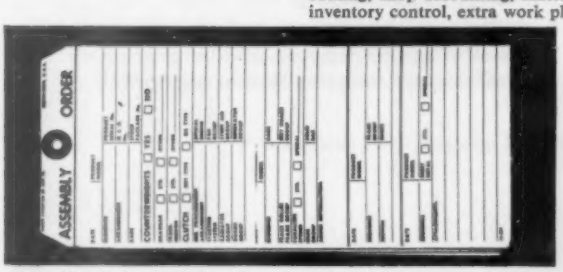
NEW CATALOG

Contains pattern descriptions, light distribution charts, transmission data. Send for your free copy today.

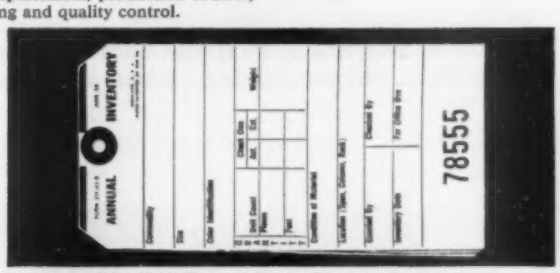
Increasing efficiency of industrial systems with precise information in concise form



Dennison Manifold Tag, consisting of tag and four slips, controls and records a complicated material correction process. Measuring 10¼" x 3¼", it provides space for legible information covering routing, shop accounting, material replacement, production control, inventory control, extra work planning and quality control.



Assembly Order Manifold Tag, an example of Dennison's use of NCR tag stock and paper, combines tag and two slips to communicate information in the neatest, most orderly way. Its actual size is 4" x 9" . . . providing room for about 50 legible entries.



Inventory Manifold Tag, 3½" x 6¼" in size, further demonstrates the versatility of Dennison's capabilities with NCR stock. In this case only two legible smudge-free copies are required.

How complicated are your systems?

No matter how many facts your tags must communicate or record, Dennison can create or adapt a tag technique that will reduce your information to its simplest form . . . at lowest practical cost.

NCR Manifold Tags represent one of the most successful means of simplifying complicated communication and recording problems. This "No Carbon Required" multi-copy method . . . made possible by chemicals patented by National Cash Register Company . . . assures smudge-free legibility of up to 7 typewritten or 4 handwritten copies. Easier and cleaner to handle than manifold tags with one-time carbons, NCR manifold tags also assure clearer, neater copies.

Dennison also produces manifold tags with one-time carbons when neatness is secondary to cost. Dennison's growing list of customers for manifold tags includes leading manufacturers in textile, chemical, metal-working and other industries.

Other Tested Tag Techniques now being used by American manufacturers can also help you achieve maximum system efficiency per tag dollar. Your Dennison Industrial Systems Representative can show you tags used to control and record every conceivable plant process or operation from receiving through shipping; single and multi-stub tags, consecutively and serially numbered; special compounds to increase resistance to handling, water, high temperature, acid, alkali and grease; patched and unpatched tags with and without string, wire or special fastening devices. And Dennison can create the tag that's right for you.

To Make a Date, contact the Dennison Sales Office nearest you, or write to Industrial Products Division, Dennison Manufacturing Co.

Dennison

Helping you compete more effectively

FRAMINGHAM, MASSACHUSETTS

Sales offices in principal cities

A COORDINATED ELECTRICAL SYSTEM IS THE KEY TO IMPROVING PRODUCTIVITY AND PROFITS

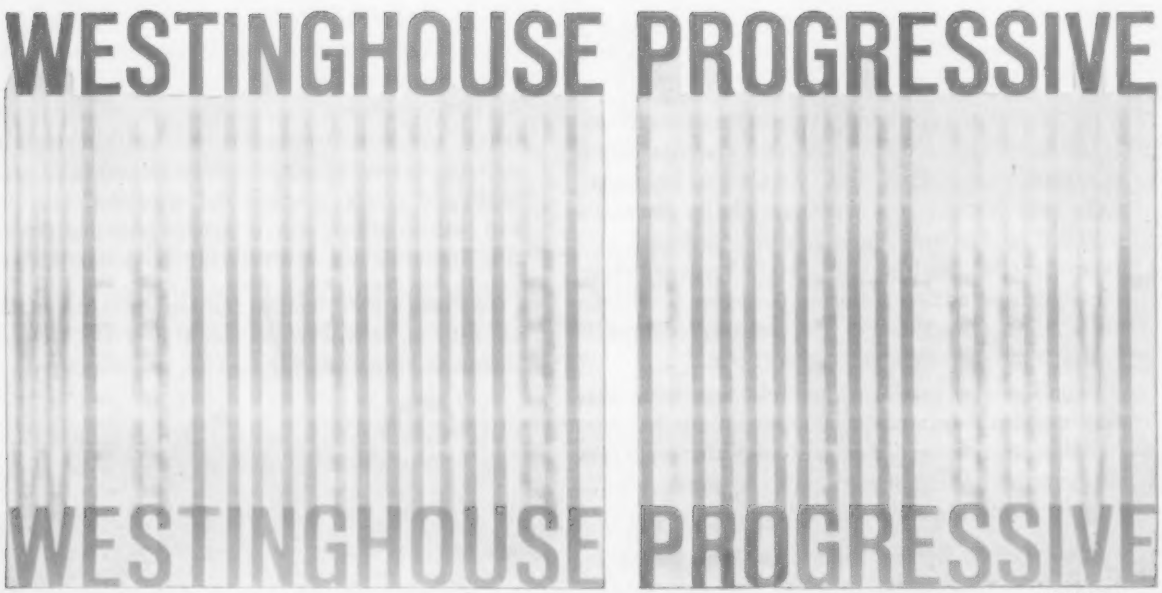
Westinghouse is ready now to help you plan economical steps to automatic production . . . to achieve your goals without over- or under-automating.

For many manufacturers, Westinghouse *Progressive Automation* has already proved a completely practical method of gaining improved product quality through step-by-step control of operations . . . a long-term plan with minimum capital cost for each step.

Now . . . automation step by step: Step-by-step automation can start with the modern Westinghouse controls, motors and drives at work in plants today. Each of these components was developed to achieve an immediate production objective . . . to control a single machine, a conveyor line or an entire installation. With this plan you then add other Westinghouse coordinating controls, all of which are compatible with those previously installed.

Benefits of long-term planning with minimum investment: First, you are meeting current production needs . . . improving productivity and/or raising product quality. Second, you are building a coordinated system . . . always ready for the next step in your long-range plan for automation. Your goal may eventually be overall production coordination under one master device . . . the Westinghouse industrial control computer.

Westinghouse—your one source for computers, controls and subsystems, and all equipment such as transformers, switchgear, motors, gearing and drives—will assume complete system responsibility.



AUTO

AUTOMATION

MATION

Examples of Progressive Automation at work:

In the primary metals industry, installations of Westinghouse PRODAC* (programmed digital automatic control) have improved product quality and mill efficiency. This system has made possible automatic control of rolling mill functions, as well as monitoring all phases of the product and process by data accumulation systems.

Westinghouse industrial control computers are now being integrated with PRODAC to transform rolling mill equipment into a completely automatic unit. Three such systems are on order and underway.

In the paper industry, PULSETTER*, an automatic digital control system, makes possible new standards of accuracy and product quality in paper production.

In the chemical processing industries, Westinghouse provides OPCON* which experiments, then finds and controls optimum production efficiency.

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Reduce stresses and prevent damage to Panel-boards, Switches, Motor Controllers—other circuit components—because let-thru fault currents are limited to exceptionally low values.

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GET ALL THE FACTS

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F-560

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After investigating the types available, Midwest chose an Ingersoll-Rand ESH compressor. To date the unit has given continuous service without trouble of any kind. Here's why:

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For more facts Circle 713 on Reader Service Card

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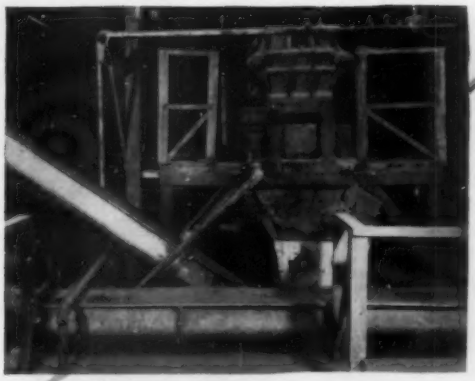

by spiral conveyors

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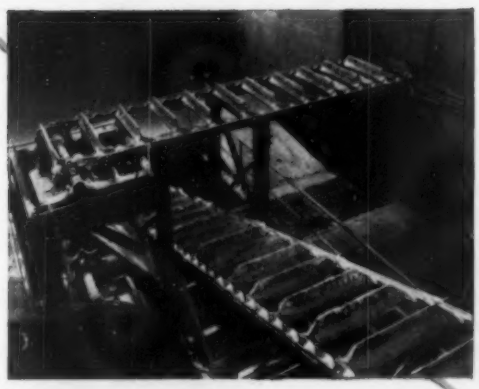
by bucket elevators



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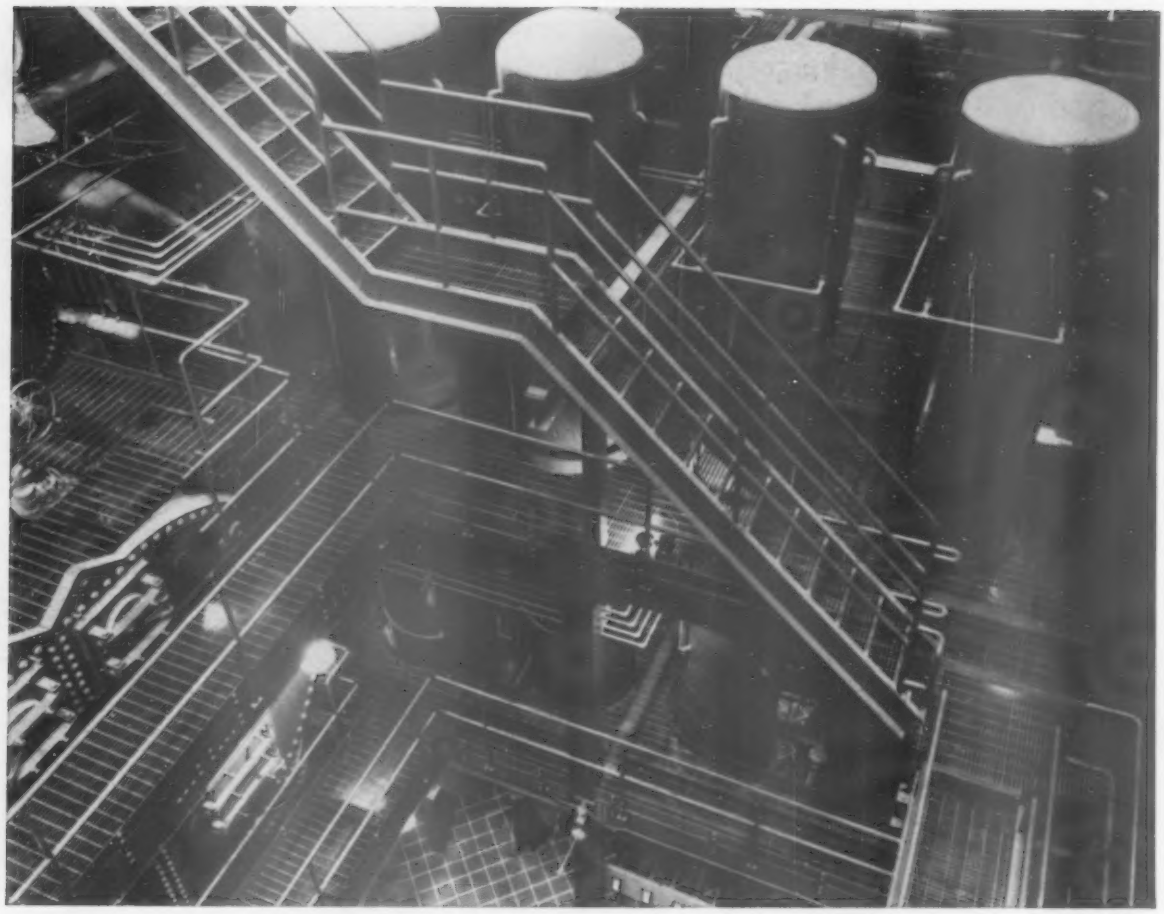

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FACTORY PRESS TIME REPORT • MAY 1960

Looking Ahead in Business

Highlights of the latest McGraw-Hill survey of business capital spending plans indicate that 1960 should end with business on the upswing—with growing capital expenditures a key reason for the generally higher levels of business.

Total spending for new plants and equipment in 1960 will come to $37.9-billion—up 16% from the $32.5-billion spent in 1959. And, more significantly, businessmen already have plans calling for expenditures of almost $35-billion in 1961.

Manufacturing companies as a whole will be spending over $15-billion for new plants and equipment this year, according to present plans. In this area, steel companies and auto manufacturers will be making the biggest increases in capital expenditures:

- Steel companies now plan to spend more than $1.6-billion—up 58% from 1959.
- Auto producers (trucks and parts included) will be spending more than $1-billion—an increase of 66% over 1959.
- Machinery producers plan to spend $1.3-billion—38% more than in 1959.

Substantial increases in capital spending are planned by almost all manufacturing industries. Total spending by manufacturers this year will top 1959 by 26%.

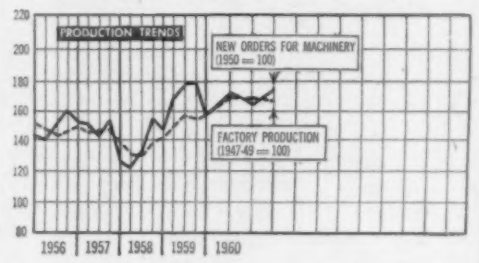
Manufacturers are counting on additional sales to back up their higher capital expenditures. In total, manufacturing sales are expected to show a gain of 8% this year over 1959.

•

Manufacturers are devoting most of this year's capital expenditures to modernization of existing facilities rather than to expansion. Of the total, 65% is slated to go for modernization, only 35% for expansion. And in line with the emphasis on modernization, most of this year's amount will be spent on machinery rather than on building.

The survey also indicated that manufacturers still have ample capacity. At the end of 1959, when steel mills were back in full swing, and industrial output was headed for a record high, manufacturers, on the average, were operating at only 85% of capacity.

FACTORY FIGURES OF THE MONTH



Indicator	Mar.[p] 1960	Feb.[r] 1960	Mar. 1959
New Orders for Machinery (exc. elec.)[1]	171.0	164.0	167.0
Contracts for Industrial Construction[2]	132.0	155.0	115.0
Factory Production[3]	165.0	166.0	156.0
Consumers' Prices (cost of living)[4]	125.7	125.6	123.7
Industrial Prices (materials, supplies)[4]	128.6	128.7	128.1
Manufacturing Employment (millions)[4]	16.5	16.5	16.0
Total Employment (millions)[5]	64.3	64.5	63.8
Unemployment (millions)[5]	4.2	3.9	4.3

[p] = preliminary [r] = revised

Sources: 1. McGraw-Hill Department of Economics (1950 = 100); 2. Engineering News-Record (1950 = 100); 3. U. S. Federal Reserve Board (1947-49 = 100); 4. U. S. Department of Labor, Bureau of Labor Statistics (1947-49 = 100); 5. U. S. Department of Labor, Bureau of Labor Statistics.

They prefer to operate at about 94% of capacity. Clearly, then, they feel little pressure to expand facilities. This year's capital expenditures will increase over-all manufacturing capacity by only 5%.

•

Continuing the trend of recent years, expenditures for research and development will again rise in 1960. Spending by all business for R&D in 1960 will come to more than $9.5-billion, and will exceed $10.7-billion by 1963. Manufacturers alone will be spending more than $9-billion for R&D this year and now plan to up their spending for this purpose to $10.2-billion by 1963.

As these business plans are turned into actual orders for equipment, you can expect to see a healthy rise in industrial output. Consumer surveys indicate that consumer buying plans, too, are strong. So you have sound reasons for expecting business to rise right through the year.

For Your Action File

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THIS FILING SYSTEM is designed to give quick access to past FACTORY articles that can help you solve your current operating problems. Here's how it works:

1. All major articles (set here in bold type) and many short items are classified according to a functional code. Codes cover basic operating responsibilities.

2. Certain articles are also coded (see numbers in parentheses) to show secondary or closely related topics.

3. To use, cut up the items below. Paste them on 3x5-in. cards, file by code number. To cross-index, copy information on a second card, file by secondary code.

For ways to use your Problem-Solving Guide and an explanation of this Decimal Filing System, write Reader Service, FACTORY, 330 W. 42nd St., New York 36.

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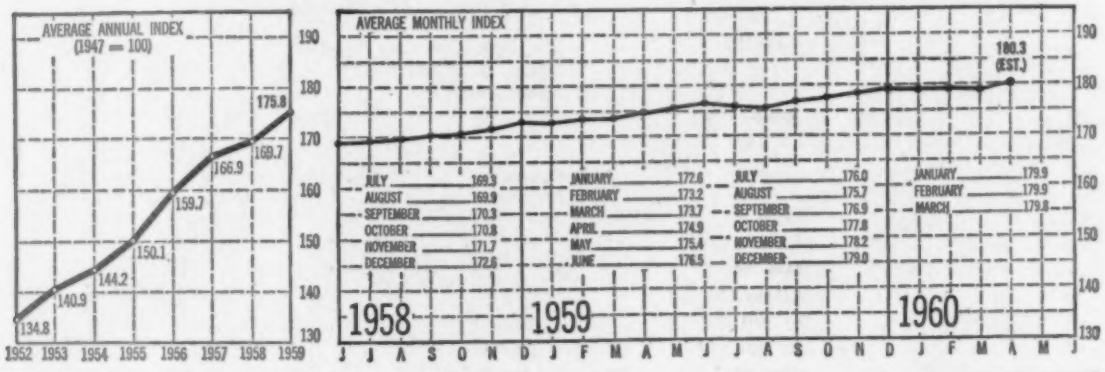
FACTORY PRESS TIME REPORT • MAY 1960

Cost Index of Plant Maintenance



Index Retreats Again

Maintenance price movements are following trend of general economic stability.

FACTORY's Cost Index of Plant Maintenance retreated 0.1 of a point in March. This marks the second time in as many months that the level has dropped. The new Index stands at 179.8.

Materials costs declined in March. And although labor costs showed some reluctance to move higher, the index for building and facilities finally did move up 0.4 of a point. Maintenance price movements are in harmony with the general trend of prices—reflecting the forces of supply and demand that have been evident since the beginning of 1960. In the main, however, we appear to be in a period of relative price stability.

Figures that helped lower the total Index were these: a decline of 0.5 of a point in the equipment index; price declines for non-ferrous alloys, nuts, bolts, and precision tools; and an unexpected 2.8-point decline in the price of electrical controls.

There is one cloud on the otherwise clear horizon. A sharp rise in copper prices on the world market during April may signal rises in the cost of domestic electrical equipment by midsummer. Uprisings in South Africa introduced the possibility of labor trouble in the copper-producing Belgian Congo. In addition, it is reported that Chilean mines are bracing for possible strikes this summer. Result: Speculators on the world market are buying heavily now, in hopes of selling if copper is in short supply later. If electrical equipment manufacturers are forced to pay these higher prices, it could well mean higher prices for wire and switchboard equipment.

	AVERAGE 1959	MAR. (Preliminary)	FEB. (Revised)
Building and Facilities Index	166.5	169.8	169.5
Materials	142.3	141.5	141.4
Brick	152.5	154.3	154.3
Elec. fixtures	129.0	132.4	132.4
Elec. switches, boards, fuses	185.6	184.3	187.1
Elec. wire, copper	138.9	148.6	148.6
Glass	152.0	152.0	152.0
Gutters, spouts, ducts	178.0	180.2	180.2
Gypsum products	140.8	140.8	140.8
Heating equipment	127.7	126.0	126.3
Lumber	134.5	133.5	133.3
Millwork	155.7	157.8	157.8
Paint	130.1	130.1	130.1
Pipe, cast iron	170.4	170.4	170.4
Pipe, steel	190.9	192.6	192.6
Pipe & tubing, copper	154.1	161.0	161.0
Roofing	123.7	114.3	113.0
Sanitary fixtures	155.6	164.1	164.1
Sash, metal frame trim	140.9	139.7	139.5
Solder	124.1	121.3	122.3
Steel, structural	236.3	236.3	236.3
Tanks, steel	138.0	140.7	140.1
Valves & fittings	166.7	172.5	171.9
Wire mesh	162.6	162.9	162.9
Labor	182.6	188.7	188.3
Carpenters	168.9	173.5	173.0
Electricians	191.1	198.5	196.9
Painters	187.9	194.2	194.9
Equipment Index	179.5	184.1	184.3
Materials	176.1	177.9	178.4
Abrasives	161.0	157.9	157.9
Alloys, non-ferrous	125.4	124.9	125.3
Bars & plate, steel	227.1	227.2	227.2
Bearings	164.1	164.6	164.6
Belting	157.3	159.5	159.5
Bolts, nuts & screws	225.6	223.8	226.1
Chain	184.0	184.0	184.0
Controls (electrical)	185.6	184.3	187.1
Gear-reduction units	181.7	181.7	181.7
Hand tools, mechanics	198.2	202.8	201.1
Lubricants	124.1	125.7	125.7
Motors	147.3	148.2	148.2
Non-ferrous metals	129.0	136.6	136.6
Precision tools	156.6	158.2	158.7
Pumps	194.8	196.1	195.2
Tools, cutting	172.4	183.0	182.4
Valves & fittings	166.7	172.5	171.9
Labor	181.8	188.3	188.3
All mfg. labor	179.9	185.2	185.2
Machine tool labor	184.2	191.4	191.4
FACTORY'S COST INDEX	175.8	179.8	179.9

FACTORY PRESS TIME REPORT • MAY 1960

Looking Ahead in Labor

The 1960 political elections will show important strategy shifts on labor issues. Union leaders and employers are changing many campaign techniques used in past years. Both sides are more heavily involved than ever, but past experience has made them cautious and their approaches more subtle.

Take the big right-to-work issue. Ever since the 1947 Taft-Hartley Act permitted the states to outlaw compulsory unionism, the issue has been before the voters or state legislatures each year.

In the 1958 elections, proposed laws were on the ballots in six states. One, in Kansas, was approved, making 19 states in all that bar contracts requiring membership in a union as a condition of employment.

Not so in 1960. Right-to-work is unlikely to show on any state ballot. It doesn't mean either side has cooled off. The subject is as hot as ever, and is getting just as much attention. But just because it is so hot, the politicians will steer clear of using it for political promotion in November.

The right-to-work issue simmers outside the political arena, however. The newest offshoot of union security plans—the "agency shop"—has been ruled illegal in a recent decision by the Nebraska attorney general. This is the contract clause that requires non-union employees to pay the equivalent of union dues and assessments to the union.

The United Steelworkers signed an "agency shop" agreement with the major steel producers in their latest settlement. It was designed to get around the union shop ban in the 19 right-to-work states. With Nebraska's rejection, it leaves only three states where the plan isn't specifically outlawed. In Indiana, the attorney general ruled two years ago that the provision does not violate the state right-to-work act.

The issue is pending before the Kansas Supreme Court, and in North Dakota it is restricted to union collections of a worker's share of bargaining costs.

The "agency shop" is also going through a federal test. General Motors and the United Auto Workers are opponents before the National Labor Relations Board where the union accuses the auto manufacturer of refusal to bargain.

General Motors had declined to sign any agency shop agreement on the grounds that it violates the Taft-Hartley Act by assisting unions where membership is not required as part of the contract.

•

Another political newcomer is the Teamsters Union. The 1960 campaign will test the effectiveness of the giant union's new department—DRIVE. The full title is the "Democratic, Republican, Independent Voter Education" program. This is already operating, complete with political form charts to be used by Teamster business agents and precinct chairmen. Idea is the brainchild of Teamster President James Hoffa. Until 1960, the 1.6-million-member Trucking Union has concentrated on local and state politics.

These instructions have gone to all Teamster stewards: "1. Obtain map, from City Hall or county headquarters of either party—and mark off exact boundaries of precinct. 2. Make street-by-street card file of Teamster members. 3. For each adult Teamster family in precinct, write in whether registered, party affiliation, whether willing to be a volunteer in politics. 4. Recruit neighborhood stewardesses who will be responsible for members in registration and get-out-the-vote campaigns."

Though AFL-CIO and Teamster national headquarters are at odds, political alliances are expected between DRIVE and COPE—the Federation's Committee on Political Education. Both groups will concentrate on registering union members as voters. (They rank slightly under the average U. S. registration.) The theory is that union voters will do the rest if they are properly advised. But union officials disclaim—rightly—that they can deliver the vote.

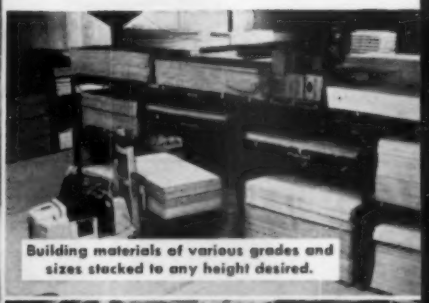
•

A third political switch for 1960 is the political caution of top union officials. There's no doubt they'll ride the Democratic donkey in the Presidential campaign. But, with a host of Democratic candidates, they're playing no favorites until the nomination. This is particularly difficult for such prime labor supporters as Senator Hubert Humphrey who, in any other year, might well expect some outspoken support in his behalf. This time, George Meany, Walter Reuther, and others don't want to be backing a horse that doesn't run.

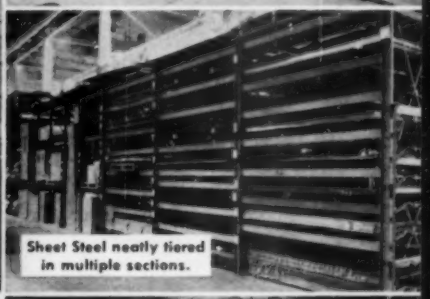
SEE LABOR RELATIONS NEWS, PAGE 208

How Much Money Can You Save In Your Storage Area?

Diesel oil and gas engine miscellaneous parts efficiently stored in P-S racks.



Building materials of various grades and sizes stacked to any height desired.



Sheet Steel neatly tiered in multiple sections.

DEPENDABLE CONSULT P-S FOR THE BEST MATERIALS HANDLING EQUIPMENT

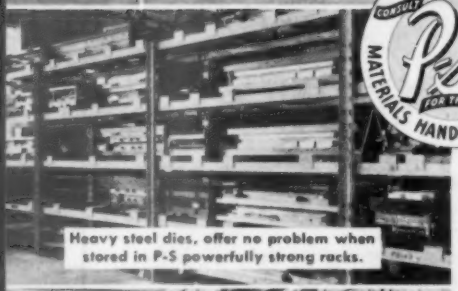
POWERFULLY STRONG

Adjustable STORAGE RACKS

Simple and Easy to Assemble

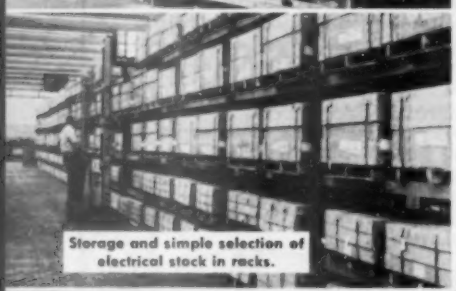
- NO BOLTING
- NO WELDING
- NO SMALL PARTS

Designed and built for any type of storage space requirement, to save you time and money by eliminating multiple handling operations. Can be used anywhere, in any size area, in single, double or multiple sections, to store materials of various sizes, shapes and weights. Also can be galvanized for outside use. For rigid, non-sway support, adjustable members lock by hand into double slots set at angle on uprights at level desired. For a solution of your materials handling problem always consult Palmer-Shile.



Heavy steel dies, offer no problem when stored in P-S powerfully strong racks.

Note rack shelf is adjustable to any level for miscellaneous stock needs.



Storage and simple selection of electrical stock in racks.

Use all your inner space with racks made for economical use of floor to ceiling space.

Racks may be galvanized for outside storage purpose.

Aluminum and copper being handled in racks adjustable to various height openings.

24 feet high racks in automotive plant receiving area.

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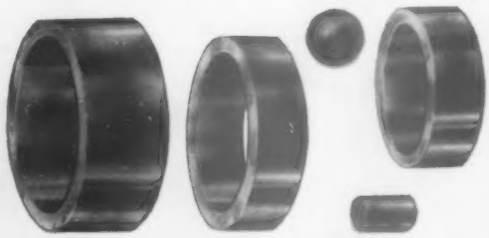
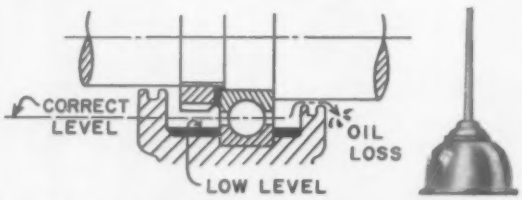
DISTRIBUTOR DAN, the SKF bearing man, tells

WHY BEARINGS BECOME OVERHEATED

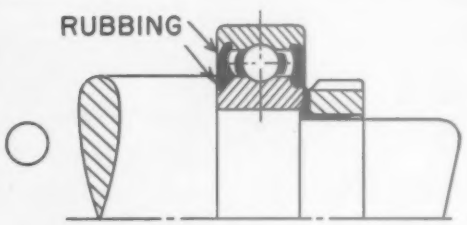
and how to correct the conditions that cause excessive heat.



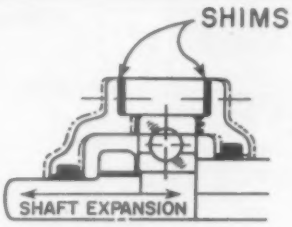
LOOK FOR THIS SYMPTOM. Discoloration of a bearing's rings, balls or rollers is a sure sign of overheating. The color is usually a gun-metal blue or bluish black.



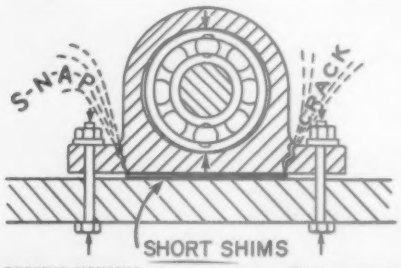
IMPROPER LUBRICATION OR LUBRICANT accounts for most cases of overheating. In pillow blocks, if oil is specified, fill only to the center of the lowest ball or roller in the bearing. If it's grease, the lower half of the pillow block should be filled. Therefore, be sure you're using the right lubricant—**in the proper quantity.**



RUBBING is a frequent culprit. Check the running clearance of the bearing seal. If it rubs against the shaft shoulder, re-machine the shoulder, to allow proper clearance. Bent lock-washer prongs are sometimes to blame. Straighten them or replace the washer.



EXTERNAL HEAT, conducted through the shaft, can make an inner ring expand excessively. It's usually the result of using a bearing with inadequate internal clearance. Make sure the replacement bearing is exactly the same as the original bearing. Should the markings be indistinct, consult an **Authorized SKF Distributor.**



THE BEARING HOUSING may be to blame—if it's warped or if the bore is distorted and out-of-round. Check to see whether the bore is pinching the bearing and relieve by scraping the bore. Make sure, too, that the pedestal surface is flat and that any shims cover the entire base area.

Baffled by a bearing problem? Whether it's selection, mounting, or maintenance—consult your Authorized SKF Distributor. He's staffed to help you keep them running smoothly and he stocks all the bearing types and sizes you need.

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Trends You'll See in

The Wonderful New Plants of 1960

You'll see thought-provoking changes. There's a swing toward conservatism in appearance. A shift toward more versatile materials of construction. A move toward more built-ins for material handling and plant housekeeping. A slowing down in the rush to the suburbs. And an encouraging step forward in designing expandable plant electrical services.

FACTORY editors drew these conclusions (and many more, below) from a year-long study of more than 500 new manufacturing plants completed in the United States during 1959. Led by our roving buildings and facilities editor, Oswald Stewart, we examined the state of the art in planning, designing, and constructing new manufacturing plants in almost every state in the nation. We looked at thousands of photographs and blueprints, read millions of words, debated endlessly. Finally, we examined—at first hand—two dozen of the choicest, most challenging new plants in the country. From these, we picked the top ten plants in America (see page 81).

And then we settled back to reflect on the significant trends the 500 new plants are pacing. Trends that will affect the thinking of plant operations managers in factories of all kinds—old and new, large and small. We detected these 20 significant trends in the new plants of 1960:

MORE EMPHASIS ON FAST CONSTRUCTION

Owners want to put their new buildings into operation fast. Pressure is on for faster construction. Financial men want to start reaping a return on capital money as soon as possible.

MORE EMPHASIS ON POLLUTION CONTROL

Managements of the new plants seem intent on avoiding the appearance of a public nuisance. They are anticipating stricter air and steam pollution legislation. An example: One plant cancels its dust and fumes with an elaborate filtering system. Eliminates stack and plume, traditional symbol of the public nuisance.

MORE EMPHASIS ON SYSTEMATIC SITE SELECTION

This year, fewer plants are choosing their locations haphazardly. Decisions in 1960 are based more upon logic, facts, and figures than upon emotion.

LESS EMPHASIS ON DESIGN INNOVATIONS

Most companies weren't ready for a "model change" this year. They held fast to their concept of what a manufacturing plant should look like and how it should be laid out. Result: This year's plants are characterized by tried and proven facility and process design.

Turn the page

LESS EMPHASIS ON EXPANDABILITY

Sheer space has lost some of its attraction. While most plants are still looking for roomy acreage, manufacturing cubage is more closely tailored to present requirements. At least one plant voiced the opinion that expandability would have to come from improvements in manufacturing techniques—not from building.

MORE EMPHASIS ON INTEGRATED MATERIAL HANDLING

Fewer new plants are built like cracker boxes. More plants are designed to conform to demands of process and flow. We found more built-in cranes, hoists, monorail systems, dock levelers, and special devices for handling products. One plant has over nine miles of conveyors. And also incorporates into its design piggy-back handling of trailer loads onto freight cars.

MORE EMPHASIS ON THE COMMUNITY'S RESPONSIBILITY

Civic groups are selling their attractions harder than ever. Center cities, in more than one instance, hung onto their industrial taxpayers this year with desperation. Forecast is that suburban and rural site salesmen will be meeting stiffer competition from established industrial communities. One big indicator: Labor costs, as such, are becoming much less a factor in picking a new site.

MORE EMPHASIS ON FLEXIBLE PLANT LAYOUTS

As manufacturing equipment tonnage gets larger and larger and floor loadings heavier and heavier, more and more plants will utilize flexible mountings to simplify machinery shifts and to provide greater flexibility for process changes.

MORE EMPHASIS ON MECHANIZATION

The inexorable move toward automation has not slowed down. Evidence is to the contrary. New plants include more specially designed equipment for mass production than ever before. Transfer equipment is showing up in industries where it has never been seen before.

MORE EMPHASIS ON REDUCING INDIRECT COSTS

There's a drive on to control the number of service employees, indirect laborers, and staff people. New plants are working harder to cut the fat out of non-producing work groups. Indicators: more self-maintaining construction materials such as plastic, aluminum, stainless, and glazed exterior walls. Self-regulating, package boiler systems show up almost anywhere that process steam is not an important factor.

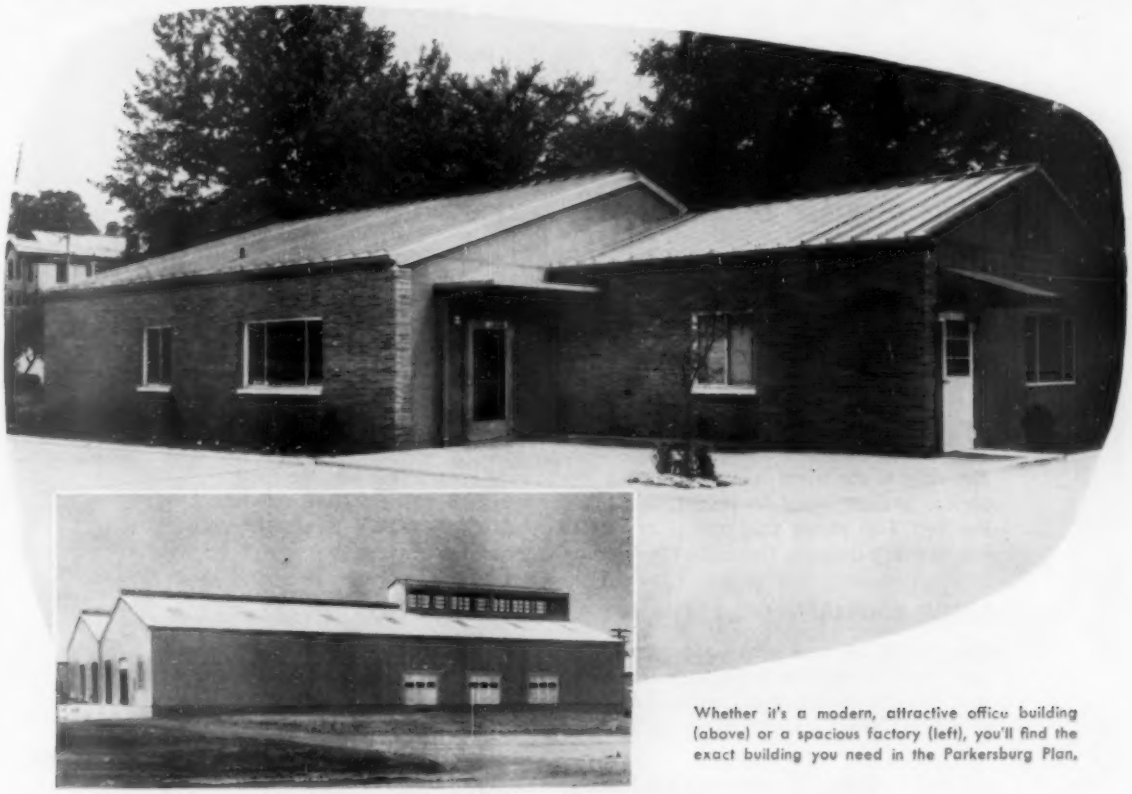
MORE EMPHASIS ON ADEQUATE ELECTRICAL SERVICES

There is an encouraging trend toward greater expandability of the plant power system. Built-in overload protection is modern and adequate, too. Even lighting levels are moving up (although in factory areas, they're still below recommended standards of the Illuminating Engineering Society). In general, we conclude that builders of new plants are finally paying heed to the predictions of accelerating industrial power consumption in the 1960's.

LESS EMPHASIS ON HANDSOMENESS OF PLANT EXTERIORS

While today's exteriors are clean and functional, many of these recession-planned plants apparently held back that little extra capital needed to provide the striking good looks that characterized last year's new plants.

Turn the page



Whether it's a modern, attractive office building (above) or a spacious factory (left), you'll find the exact building you need in the Parkersburg Plan.

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Your Parkersburg Building is tailored to your exact requirements. Production line efficiency and thousands of hours of engineering experience give you a top-quality, fire resistant metal building with maximum economy.

Your Parkersburg Metal Building will go up fast, significantly faster than conventional structures. Parkersburg high-quality construction means years of low maintenance.

Whether you need a warehouse, terminal, factory or business office, you'll find just the building you want in the Parkersburg Plan. Your experienced Parkersburg Dealer-Erector can give you complete information, including financing arrangements. Look for his name in the yellow pages under "Buildings, Steel" or write to Parkersburg for Data Book BD-959-9.

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MORE EMPHASIS ON EMPLOYEE COMFORTS

The hard line on labor relations is not reflected in 1960's plants. Facilities almost everywhere are downright unbelievable when compared with conditions only a score of years ago. New benchmark: Recreation areas—rare in the 50's—are commonplace today. One small plant even has an indoor swimming pool. Exception: The trend to comfort air conditioning (except in offices) seems to have leveled off.

MORE EMPHASIS ON BUILT-IN HOUSEKEEPING

Even traditionally dirty industries—like rubber—are enclosing the process in order to contain carbon black "fall-out." A cement company uses filters so effectively that polished shoes on plant operators fail to show white powder. An auto plant interior looks like the inside of an electronics factory. How's it done? By greater participation of quality control people and line operations managers in plant design and specification.

LESS EMPHASIS ON COMPANY-OPERATED FOOD SERVICES

Not only is the trend still to vend, but it's toward contracting out the food service responsibility to professional restaurateurs. Statistic: Nine out of the Ten Top plants this year offer vended food service; seven have cafeterias, but in every instance these are operated by catering contractors.

MORE EMPHASIS ON ECONOMY OF CONSTRUCTION

Builders of the new plants are pressing their planners, designers, engineers, and builders for new ways to build more cheaply. There are fewer frills this year, lots of evidence of pencil-sharpening. More plants are considering prefab buildings. More are using pre-assembled partitions.

MORE EMPHASIS ON COLORFUL INTERIORS

New materials and new paints are showing the way to more cheerful working areas. The traditional dingy, dark feel of manufacturing is being rapidly replaced by a sense of openness and airiness, and most striking of all, by soft pastel colors.

LESS EMPHASIS ON BIG PLANTS

While a few giants are built each year (Western Electric and Chrysler are good examples in 1960), most of the new plants are planned for less than 1000 employees. Causes: many—including a desire for geographical decentralization. Also, it's just plain difficult to run most big plants effectively.

MORE EMPHASIS ON NEW CONSTRUCTION MATERIALS

Companies building plants today benefit from competition among vendors of building materials. Consequently, new materials are replacing older ones and older ones are being used in new ways. Most significant indicator is the launching in December 1960 of a brand-new national conference and show of industrial building materials and methods. Called the Industrial Building Congress and Exposition and sponsored by America's leading architects, engineers, and builders, it will be held at the New York Coliseum.

MORE EMPHASIS ON BUILT-INS

Communications and management controls reach a new level of sophistication in the new plants. Instrumentation for process control is widely accepted, even in metalworking plants. Coming in fast are centralized communications systems for plant protection and general management control. Coming up even faster are integrated paperwork systems, mechanical and electronic systems for information handling, and data processing.

No matter what your gas heating problem, there is a Wing heater designed to do the job.

Gas-fired Unit Heaters for small areas — stores, offices, motels — or for supplementary heating of large areas.

Gas-fired Duct Heaters for use where the heat must be moved through ductwork to other areas for proper utilization.

Gas-fired Duct Heater Assemblies for large areas. These units, which are available with two, four or six heaters, coupled with the proper choice of one of the many Wing fixed or revolving discharges, can cover areas ranging up to 132′ square.

Gas-fired Fresh Air Supply Heaters — for supplying fresh, heated make-up air to increase the efficiency of exhaust systems, provide positive pressures that prevent drafts and cold air leaks into the building. Increase workers' comfort. Available for roof or wall mounting.

These gas units, as with all Wing heating equipment — gas, steam, hot water or electric — are manufactured to provide low installed and operating costs.

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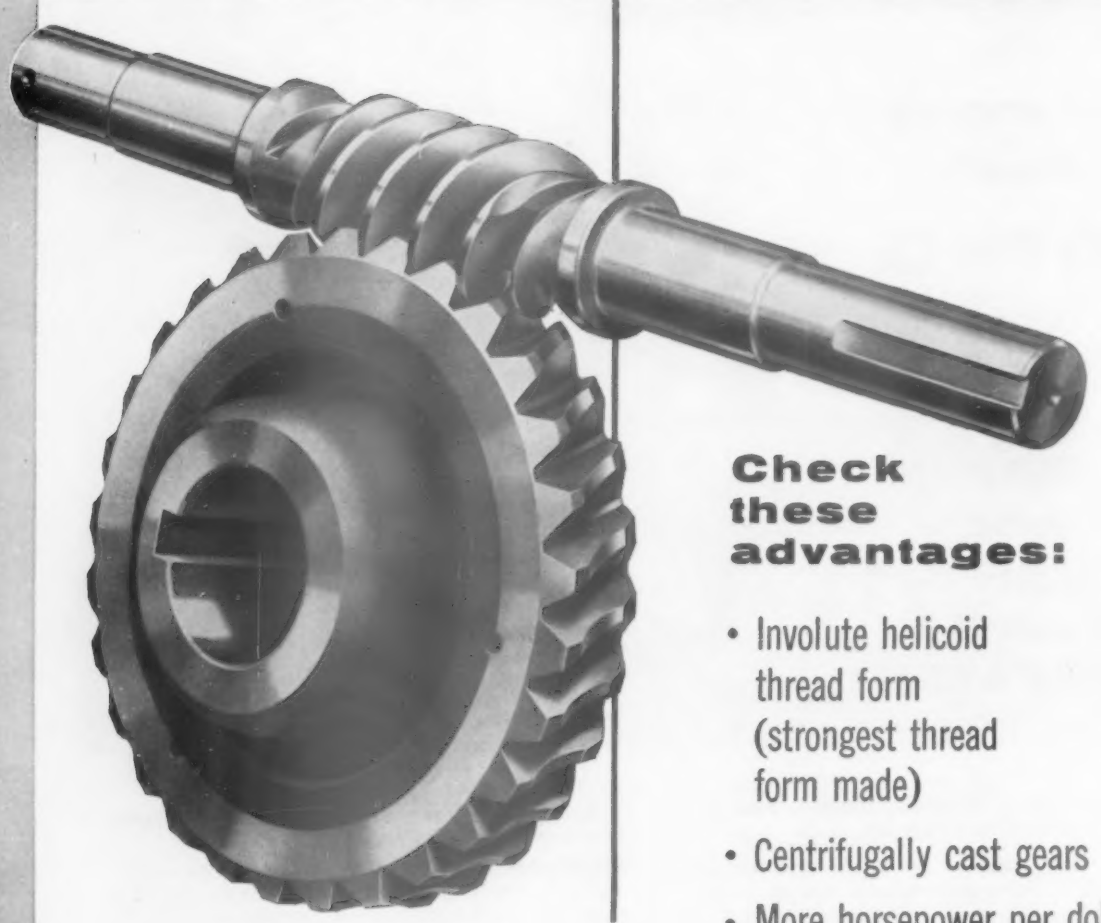
DELROYD

WORM GEAR SETS



Check these advantages:

- Involute helicoid thread form (strongest thread form made)
- Centrifugally cast gears
- More horsepower per dollar

Delroyd units are manufactured in a modern plant devoted specifically to the production of worm gearing—a plant which has one of the largest thread milling and thread grinding capacities in the United States. Because we use this exclusive precision machinery, the most exacting testing techniques and highly skilled workmanship, you are assured of quality and service associated with the leading specialists in worm gearing.

Delroyd provides the widest range of sizes and ratios, and offers complete interchangeability of parts. Whether you specify worm gear sets or worm gear speed reducers, you are assured of the finest quality obtainable.

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DELROYD

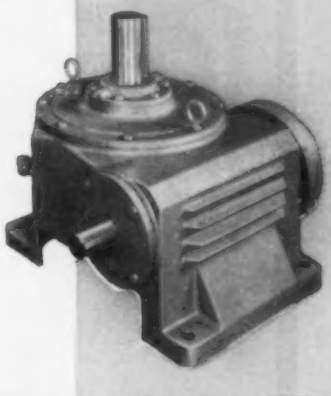
WORM GEAR SPEED REDUCERS

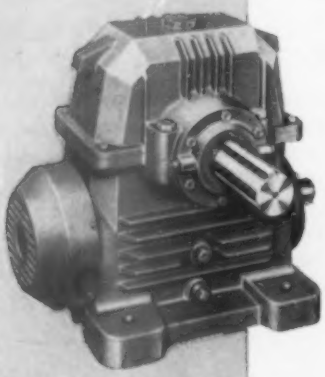
FAN COOLED RIBBED CASES

Widest range of ratings available—from .05 HP, 1⅛" center distance to 1050 HP, 36" center distance—in single and double reduction units

TYPE D
Verso Unit
Adapts to any mounting requirement
Ratios:
5:1 to 70:1
Horsepowers:
.062 to 13.5
Center distance:
2½" to 4"

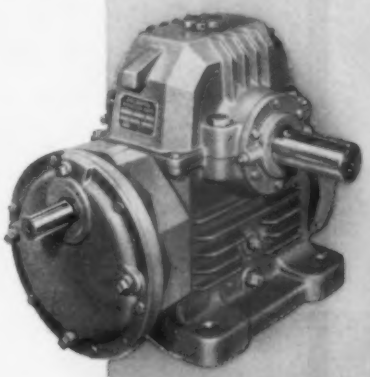
TYPE V
Vertical single reduction
Shaft up or down
Ratios:
5:1 to 70:1
Horsepowers:
.062 to 150
Center distance:
5" to 12"

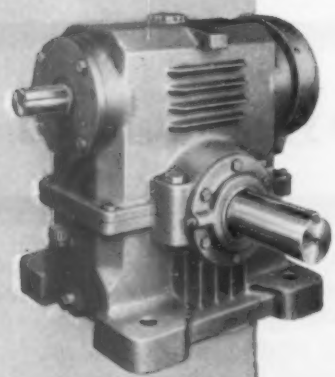




TYPE B
Horizontal single reduction
Bottom drive
Ratios:
5:1 to 70:1
Horsepowers:
.062 to 150
Center distance:
5" to 12"

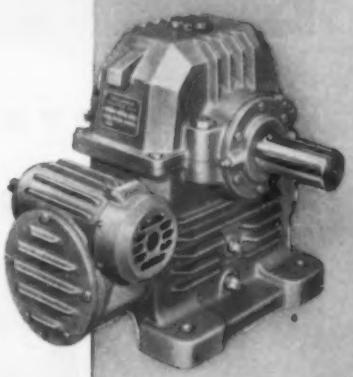
TYPE HB
Horizontal helical-worm
Right angle drive
Ratios:
15:1 to 355:1
Output torque:
2460 in. lbs. to 135000 in. lbs.
Center distance:
3½" to 12"





TYPE T
Horizontal single reduction
Top drive
Ratios:
5:1 to 70:1
Horsepowers:
.062 to 150
Center distance:
5" to 12"

TYPE DB
Horizontal double-worm
Parallel input and output shafts
Ratios:
75:1 to 4900:1
Output torque:
4170 in. lbs. to 135000 in. lbs.
Center distance:
3½" to 12"



Prompt delivery from stock—all units through 12 inch center distance

DE LAVAL *Steam Turbine Company*

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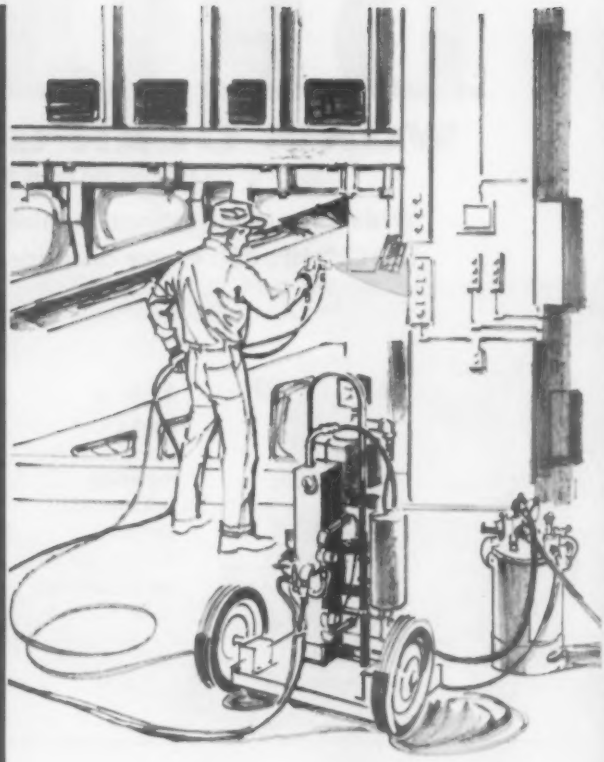
804 NOTTINGHAM WAY, TRENTON 2, N. J.

Airless spray

This relatively new method creates a fine paint spray without atomizing air. It gives you fast, full coverage of expansive areas. Even heaviest materials can be applied with utmost speed for an even, "wet" coat that gives thorough protection. There's less bounce-back and overspray. Two operators can work from single 10-gallon-capacity portable DeVilbiss outfit.



Hot spray

DeVilbiss portable paint heater lets you take hot spray anywhere on the job. DeVilbiss hot spray thins paint with heat, allows easier atomization with up to 50% reduction in spraying pressure to greatly reduce overspray. Applies higher solid materials for greater film protection, less shrinkage and pinholing; results in better flow-out of material.

Never before--so many painting

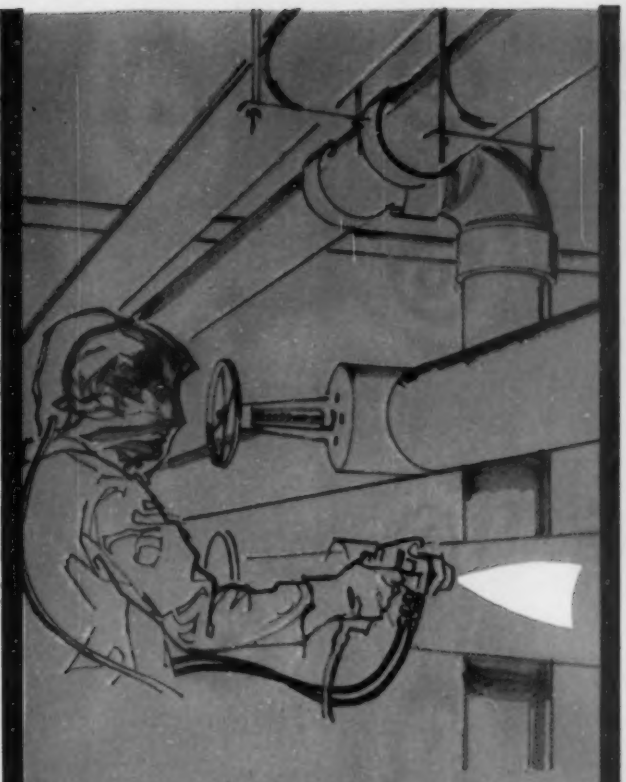
DeVilbiss total service helps you select!

In maintenance painting, it's not what you do, it's the way that you do it . . . to get the longest lasting coating in the shortest application time.

That's where DeVilbiss total service comes in. DeVilbiss manufactures equipment to apply materials by all major coating methods: hot spray, "cold" spray, airless spray, and plural-component spray. You get

Conventional spray

The most versatile and convenient maintenance-painting methods are with standard DeVilbiss spray guns. There are models for all commercial protective materials, from the thinnest oils and paints to the heaviest mastics. Extension guns, in a variety of lengths for reaching normally inaccessible areas, are available with a wide selection of caps.



Plural-component spray

DeVilbiss offers large-capacity guns for applying materials that require catalyzing agents or other additives. The components mix outside the gun head, eliminating "pot life" problems and crucial gun-flushing operations. Accurate adjustments maintain exacting ratios of coating material and additive. They'll even apply polyurethane foam-in-place materials.

methods to choose from

unbiased recommendations on outfits best suited to the job. Plus operator training to help you make the most of the equipment you invest in.

Call DeVilbiss for total service. Check the Yellow Pages for our representative nearest you. The DeVilbiss Company, Toledo 1, Ohio. Also Barrie, Ont.; London, Eng.; São Paulo, Brazil. Offices in principal cities.

FOR TOTAL SERVICE, CALL
DEVILBISS

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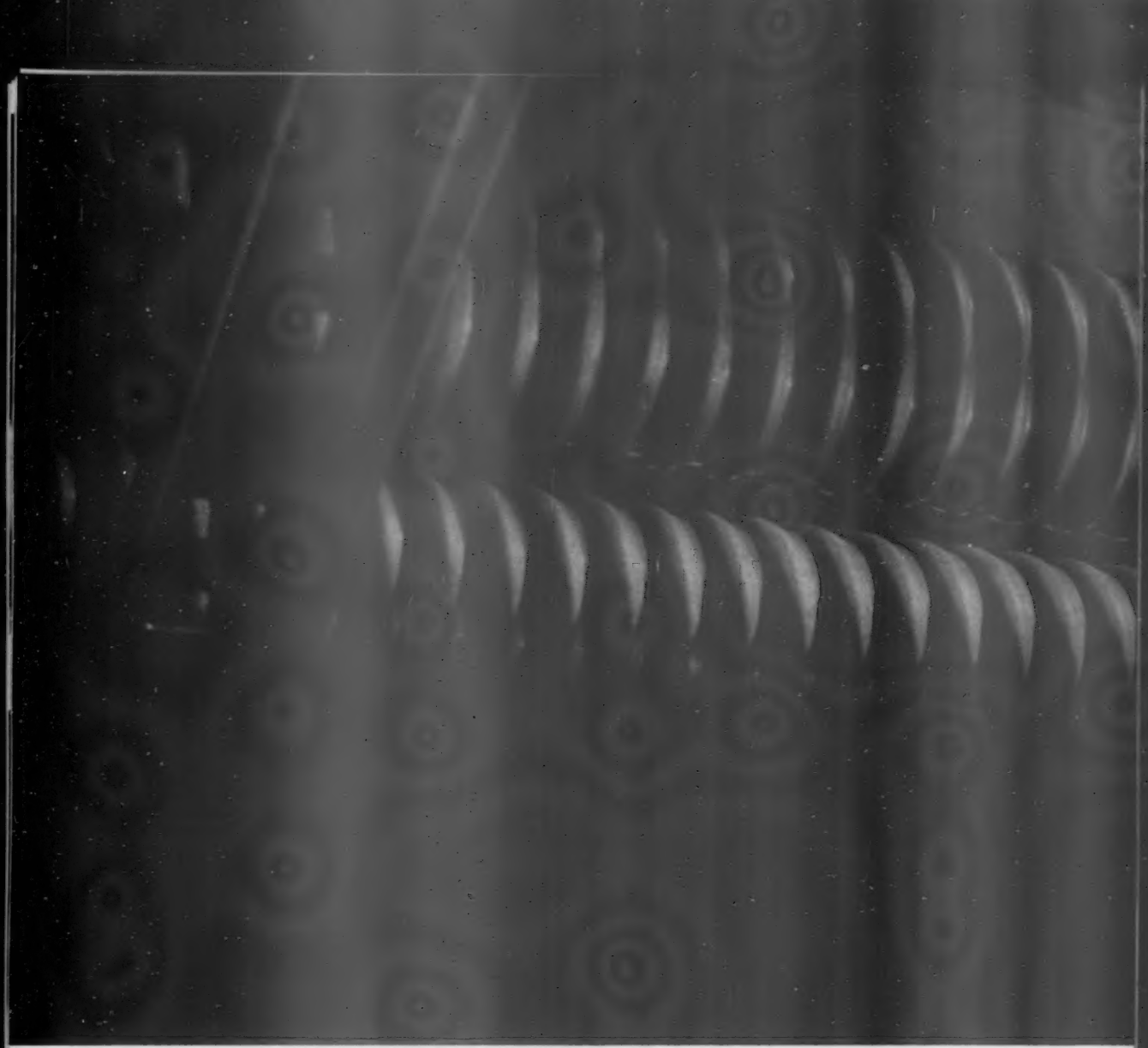


Installs like cable . . . protects like conduit!

Conduit-like protection . . . yet it's *flexible!*

And because it's flexible, you can install Rome's interlocked armored cable as easily as most ordinary cables—around corners, machinery, other obstructions. You merely pull it through in long, unbroken runs on low-cost cable-supporting ladders,* or suspend it aerially with cable rings. Where you need to splice, a mechanical joint does the job in a jiffy.

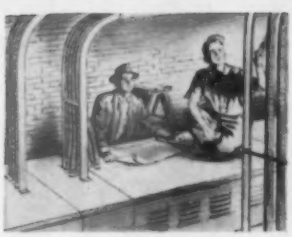
Rugged protection And it's *rugged.* A metallic armor of aluminum alloy, bronze or galvanized steel provides high mechanical protection for your electrical system. If you need exceptional corrosion resistance, you can get it with a thermoplastic (PVC) sheath over the armor.

Increased ampacity Because it approaches a free-air type of installation, Rome's interlocked armored cable has a high current-carrying capacity. Heat is dissipated readily—not trapped as it would be in conduit.

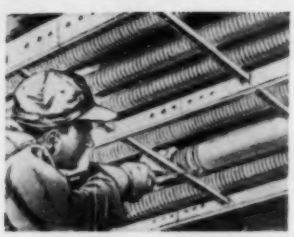
Saves space And you save space—almost one inch less space for each 3/C 500 MCM of interlocked cable than for conduit-type installation. Just one cable ladder* supports a substantial number of interlocked armored cables, takes far less space than multiple-conduit runs.

For heavy-duty service You can use Rome's interlocked armored cable for almost any heavy-duty service application: in power plants, food processing plants, refineries, steel mills, pulp and paper mills, chemical plants. It is widely used for high-voltage primary feeders from power stations to unit substations and for secondary feeders from unit substations to load centers.

Available in three-conductor construction, rated at 600, 5000 to 15,000 volts. You can get all the details in Bulletin RCP 730. Clip and mail the coupon for your copy.



Easy to service You can make inspections easily—cables are fully accessible on open cable-supporting ladders,* or suspended on cable rings. In case of accidental damage, you merely cut out a short section and splice. No need to pull out the cable as you do with conduit.



Easy to add new circuits In the event of changes in plant layout, the simplicity of these systems makes it easy to add new circuits to existing runs. Systems can also be easily and quickly dismantled and reinstalled elsewhere—with a minimum of scrap.

Cable-supporting ladders (either galvanized or aluminum) are manufactured by T. J. Cope Division, Rome Cable Corporation, Collegeville, Pennsylvania.

Insulation The butyl compound insulation (Rozone A) used on Rome's interlocked armored cable is heat-, moisture- and ozone-resistant. Cable can be installed out of doors or in other damp locations safely. Metallic armor provides exceptional mechanical protection.

ROME CABLE
DIVISION OF **ALCOA**
Department 21-50, Rome, New York

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City ..... Zone ..... State .....

ALCOA
ROME CABLE DIVISION

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A GUARANTEED ROOF OVER YOUR HEAD

New...and only with Butler...
full 20-year roof protection for
pre-engineered buildings

Here's another reason to "go Butler" for your new building this year. You can have a preferred aluminum roof of such job-tested superiority that we are now able to offer a *20-year guarantee.*

This is the first and only long-term roof guarantee for pre-engineered buildings. It is made possible by Butler's leadership in designing and fabricating an enduring, weatherproof aluminum roof system that today has an impressive history of outstanding performance on thousands of Butler Buildings. Be sure that this new development in roof security, optional at nominal extra cost, is considered in your building plans.

Your Lowest-Cost Way to Build Well—superior roof protection is one of many reasons why more offices, plants, stores, warehouses, terminals, recreation centers, schools and churches every year are being built with the Butler Building System.

For your new building, take advantage of the wide, clear spans of Butler rigid frames . . . the beautiful new Butler-Tone™ baked-on color finishes for wall and roof panels . . . your choice of the finest factory-insulated or field-insulated exterior wall panels . . . the fast, trouble-free construction . . . and the dependable, talented services of your local Butler Builder.

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See Sweet's Industrial Construction File—Section 8-B

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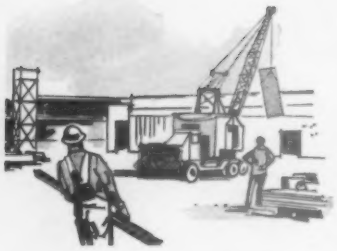

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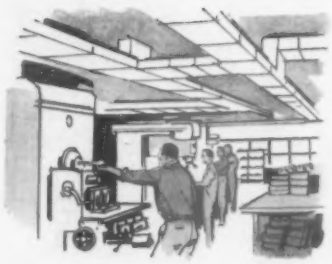

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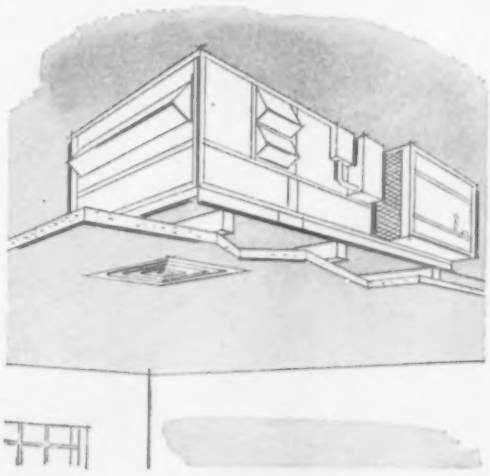
For complete details about this Carrier Commercial Weathermaker, call the Carrier dealer near you. He's listed in the Yellow Pages. Or write Carrier Air Conditioning Company, Syracuse 1, New York. **Reg. U. S. Pat. Off.*



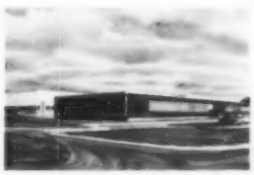
This Carrier 48B Commercial Weathermaker puts both your heating and cooling plant in the most economical of locations—your roof! It is supplied ready for fast one-unit installation. It is factory charged with refrigerant, equipped with refrigeration piping, and quickly connected through the roof to a ceiling air grille.

BETTER AIR CONDITIONING FOR EVERYBODY EVERYWHERE

Carrier

FACTORY

Top Plants of 1960
Ten Productive Masterpieces



The glowing beauty of the plants in this portfolio is obvious. Less obvious — but dynamically present in each case — is a remarkable degree of utility.

These plants were made for *work*. Their beauty is the beauty of purpose and productivity, as well as of color, line, and form.

To the owners of these plants, to their planners, designers, architects, engineers, and builders, our hearty congratulations.

THE BRUNSWICK-BALKE-COLLENDER COMPANY

Muskegon, Mich.

A sleek package containing scores of ingenious solutions to plant design problems, Brunswick-Balke-Collender's new plant is a bold, modern achievement. The crisp new assembly facility capitalizes on its parent across the road by sharing some facilities, but loses none of its distinct identity.

CHRYSLER CORPORATION

Fenton, Mo.

A self-contained manufacturing city rising out of the Missouri countryside, Chrysler's newest assembly plant pours forth dozens of passenger cars from a single, tightly scheduled line. A host of excellent plant services give balanced attention to production, maintenance, and personnel needs.

FLICK-REEDY CORPORATION

Bensenville, Ill.

With imaginative boldness, Flick-Reedy blended nine pre-engineered buildings into a de luxe production unit. A showcase of truly impressive employee facilities, the plant challenges the conventional — from its ingenious water system to its posh indoor swimming pool that serves as a fire reservoir.

G-V CONTROLS INC.

Livingston, N. J.

This compact plant attains æsthetic value at no sacrifice to high-level efficiency. Built around a delightful courtyard, it will always embrace the outdoors, despite future expansion of its outer perimeters. For its first self-owned building, G-V Controls has a remarkably suitable, sensible, beautiful, home.

IDEAL CEMENT COMPANY

Tijeras, N. M.

A concrete example of graceful forms carefully composed for efficient production, Ideal Cement's new plant argues well for broader use of its product in industrial construction. The plant's advanced instrumentation and startling cleanliness make it an industry and community leader.

KENNECOTT REFINING CORPORATION

Anne Arundel County, Md.

Reflecting the power of the operation, striking cubist-style concrete buildings dominate the ample acres of Kennecott's new plant site. Smartly arranged gray concrete manufacturing areas blend with brilliant white block and glass offices to create a plant complex of technical and æsthetic stature.

ROYAL McBEE CORPORATION

Springfield, Mo.

The look of Royal McBee's new portable typewriter plant mirrors its colorful, sophisticated consumer product. Outside, the plant is low-slung, clean, and simple. Inside, it's smooth-working, intricate, yet easy to maintain. Miles of clever conveyors seek the destination for the parts they transport.

SCREW AND BOLT CORPORATION OF AMERICA

Mount Pleasant, Pa.

Challenging its own industry's folklore, Screw and Bolt Corporation of America invested its energy and money to combine three widely scattered operations under one sleek new roof. The result: vastly improved quality and volume, and reduced costs.

THE SPRINGDAY COMPANY

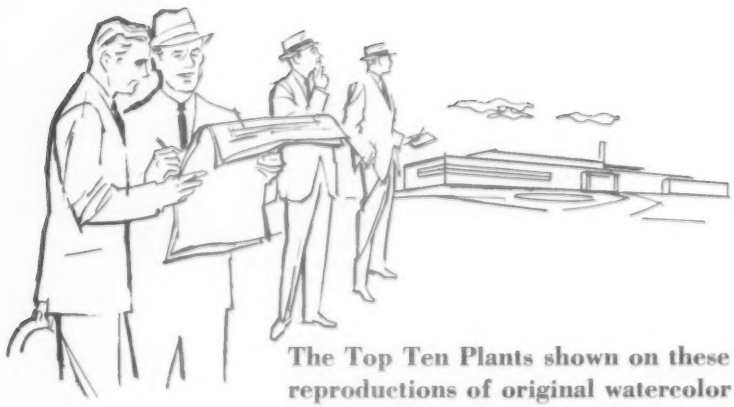
Springfield, Mo.

A masterpiece of plant layout and material handling, Dayco Corporation's new Springday Company plant quickly became the world's top producer of V-belts. Exceptional expandability, virtually dustless carbon-black handling, and minimum manpower warehousing make this a truly significant plant.

WESTERN ELECTRIC COMPANY, INC.

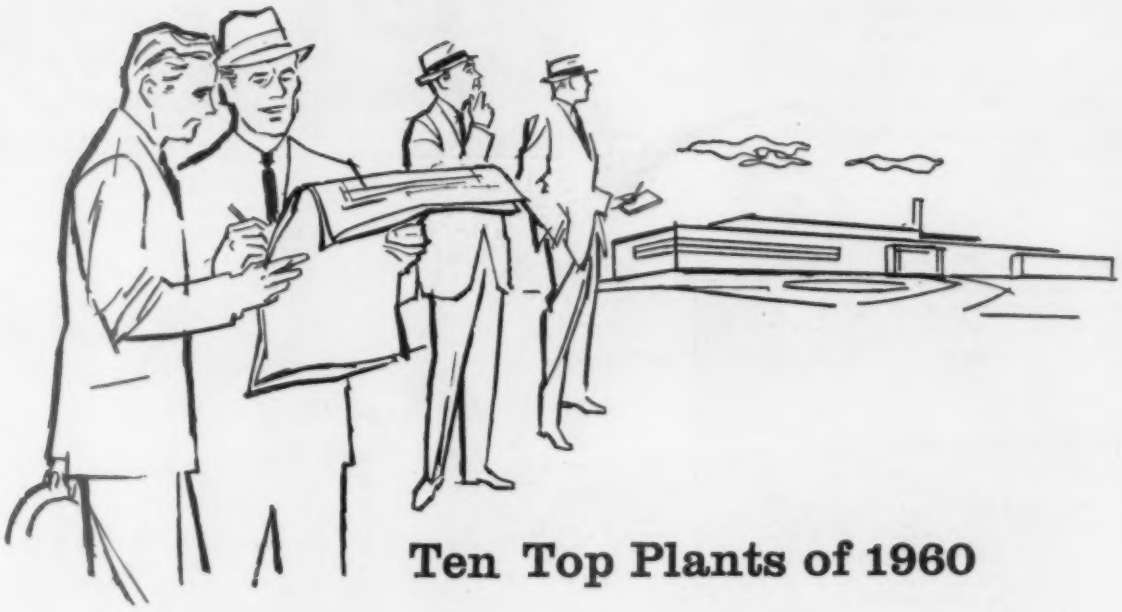
Columbus, Ohio

A progressive example of conservative design, Western Electric's huge plant is a marvel of planning for the present and future. Packed with integrated manufacturing equipment and flexible support services, the plant meets the challenge of providing a dynamic working environment for a giant work force.



The Top Ten Plants shown on these four pages are reproductions of original watercolor paintings presented to the award-winning companies. The paintings were especially prepared for FACTORY, and for the winners, by artist Kent Day Coes of New York City.

FACTORY



Ten Top Plants of 1960

The entire editorial staff of FACTORY (representing well over a century of plant operating experience) has spent a full year screening the finest new plants in America. Over 500 candidates have been relentlessly pared down to ten—the Top Ten. The editorial task force—led by Buildings Editor Oswald Stewart—spent months analyzing and debating stacks of blueprints, photos, folders, and questionnaires in this 26th annual competition. Result: the winning plants on the following pages, teeming with ideas and showing the rewards of planning and ingenuity.

Turn the page

TOP PLANTS OF 1960

THE BRUNSWICK-BALKE-COLLENDER COMPANY
Muskegon, Mich.

(Automatic Pinsetter Division)

DESIGNER-BUILDER: Cunningham-Limp Company, Detroit

Full-color painting: page 82. Details on design and construction: page 133.

CLEAN as a bowler's strike ball in the one-three pocket—that's Brunswick's two-story, window-walled office. Light-tan brick end walls blend with brick side walls of plant beneath windows.

HANDSOME oval table for conference room is made up of six folding tables that easily separate when conference room is divided.

COLORFUL office is hard to appreciate in this black and white photo. Doors, walls, desks, and chairs are a riot of tasteful pastels.

A Sleek Package of Design Solutions

Imagination — lots of it — made Brunswick-Balke-Collender's new plant a sure winner. Imagination solved the thousands of design problems inherent in any new plant, and solved them in remarkably clever ways. Here are three examples:

- The central row of building columns, instead of being boxed conventionally, was accentuated with wood wings on the flanges, then covered with decorative vinyl plastic (lower photo, left).
- A jog in the concrete block wall between office and plant was give imaginative shadow-wall treatment.
- Plant Manager Joseph Anthony chose a huge multi-color map of the world for one wall of his office. For about $11 (less than the cost of wallpaper) he purchased an Army Map Service set of nine panels, measuring a total of 9x12 feet, and had them pasted to the wall with just a little trimming. The result is a delightful effect, at low cost.

The Brunswick plant and offices are a riot of color. Colorful classroom furniture manufactured by another division of the company sets the pace for gay color and modern design throughout the offices. And the pace is

carried out in the long row of offices bordering the windows. One interior wall and the door of each office are painted in light pastels. Colors change from office to office.

Brunswick engaged a color consultant to help decorate the plant and office. (More on color in the plant later.) In addition to the color items already mentioned, the consultant turned up many other ideas that make the offices a pleasure to behold. Gold-anodized floor-to-ceiling metal dividers dress up the executive secretarial area. Sun control drapes line the window wall. Lounges for the women are unusually cheerful. The striking two-story-high lobby is tastefully done in contemporary, colorful furniture.

Here's a plant that's an imaginative model of expandable design. Principal purpose of the plant is to assemble automatic pinsetters from purchased parts and subassemblies. Expansion plans call for an addition at the rear of the building to add fabrication departments gradually as business builds up. The plant layout, accordingly, is based on present storage and assembly needs, plus future expansion plans to include fabrication prior to assembly.

Storage of parts is concentrated at the rear of the present building. Subassemblies generally move toward the front. When the plant is expanded, part of the present storage space will no longer be required. Then it can quickly be converted into appropriate manufacturing space, because all racks and bins were designed and located with that aim in mind. They are easily moved, easily converted from purchased parts storage to in-process storage.

After expansion, Brunskick plans to spot fabrication and subassembly steps around the perimeter of the expanded building, leaving the center as the storage core. This will give quick access to components. Travel distance will be kept down, delays kept at a minimum.

The office wing above is ready for expansion, too. The ground floor is 100% completed. Executive and general offices occupy one half, and engineering offices the other half. On the second floor, all services are roughed in, and factory-style fluorescent fixtures give lighting for temporary uses.

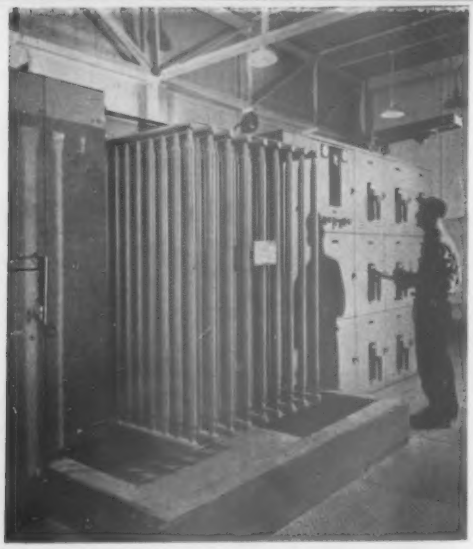
The story of how Brunswick decided on the location of its new Automatic Pinsetter Division plant is unusually exciting. You can read the details on page 197. Here's the story in brief:

Brunswick reluctantly ruled out the logical site across the street from its 50-year-old plant complex for several important reasons. The plot was too small. Access would be difficult and dangerous across the six-lane street. The state had already purchased and razed a filling station on the corner, preparing for a cloverleaf intersection for a new highway.

When civic leaders of Muskegon heard about Brunswick's plans to go elsewhere, they gathered talent and money. In a few days' time they presented a package of 13 items to offset Brunswick's reasons for relocating. Result: Brunswick stayed in Muskegon.

The new Automatic Pinsetter plant is essentially self-contained and autonomous. But its across-the-street location from the old plant gave it some fast construction and administration aids. The old boiler room was modernized and utilities were piped over to the new plant via a tunnel (page 89). The old plant supplies reserve warehousing space. And some operating functions are shared, such as central maintenance, cafeteria, Executone time recording, and IBM service.

Turn the page



SPACE IS SAVED by locating this substation on the roof. It's near the rear of the plant now, but after expansion it will be over the center of the plant.

SPACE IS ENCLOSED by colorful curtains in this welding area. They're alternately colored yellow and mustard. Welding booth has adjustable exhaust ducts.

SPACE IS ENGINEERED for maximum efficiency and minimum housekeeping in this parts storage area. Wide aisles take power sweepers and power trucks.

. . . BRUNSWICK-BALKE-COLLENDER CO.

Brunswick's factory building blends nicely with the office wing. Light-tan brick below the factory windows matches the brick ends of the office buildings. And above the windows, insulated fluted aluminum siding repeats the bold vertical lines of the aluminum window-wall mullions of the office.

Inside, the plant is spacious, brightly colored, high-ceilinged, well lighted. The color doesn't show in these black and white photos, but it is unusually dramatic and exciting. Here are the principal colors: Light-blue ceiling. Deeper blue below perimeter windows. Warm peach on front wall common to office. All machinery is light gray, with orange controls. Jigs, fixtures, and tote boxes are medium blue. Pallet racks and spray booths are chrome or aluminum. Corners of pallet boxes, racks, shelving, and cribbing are light blue. Work benches and desks are cinnamon bronze. All material-handling items are hazard yellow. And, of course, fire equipment is bright red. This plant is a far cry from the gloomy medium green of many older plants.

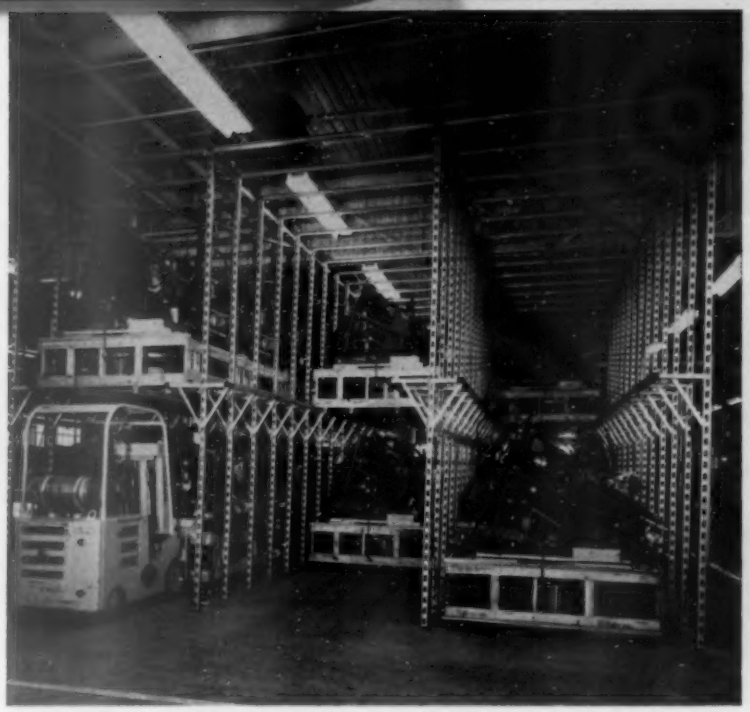
In one front corner of the plant, a 100-ft. ramp slopes down 11 feet below floor level and joins the 10-ft.-wide, 428-ft.-long tunnel to the old plant across the street. Pedestrians from the office don't need to back-track to the ramp entrance; they can hustle down a flight of steps beside the office rear wall.

There's a cafeteria in the old plant, reached through the tunnel. But for those who don't want to walk over, there's a convenient vending machine bank (photo, page 164) just beside the tunnel entrance. Colorful Brunswick classroom tables and contour chairs—just like those in the office and conference room (page 86) furnish an eating area beside the vending machines. For appearance and cleanliness, this area is asphalt-tiled. For openness, it's closed off with a tall grille beside the tunnel ramp, so windows beyond can let in plenty of daylight. The area is separated from the assembly area by a welded pipe rail.

Beyond the tunnel ramp, in an extension of the building, is an enclosed rail siding, with space for two freight cars. The rail handling dock is adjacent to the truck dock area. Both are at the rear of the plant. The truck area handles all present receipts and shipments. Later, when the plant expands, shipping will remain where it is, but receiving docks will be at the new rear.

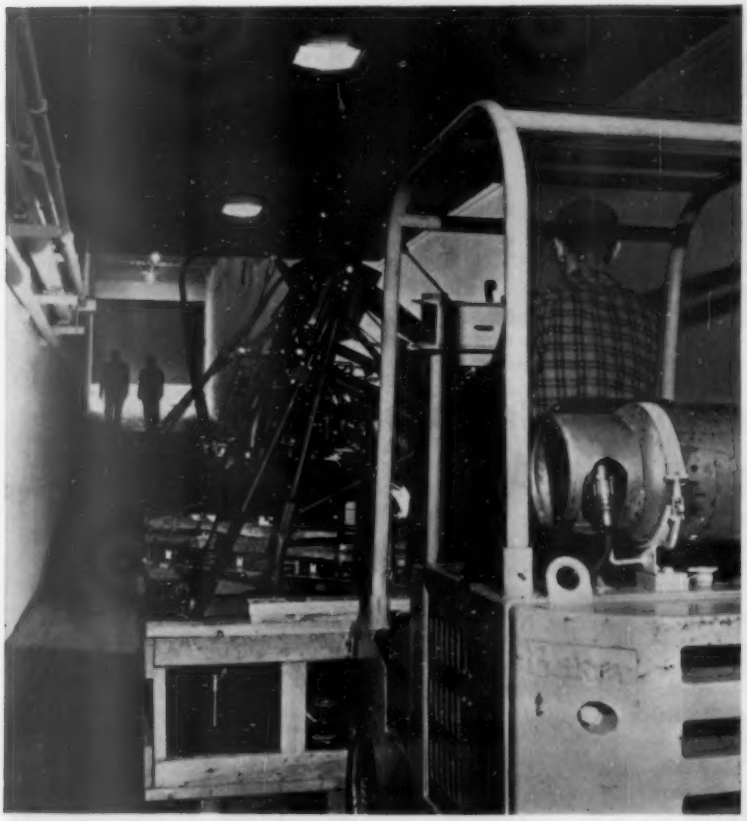
Electrically, plenty of expandability and flexibility is built in. The electrical substation is in the penthouse (shown top, left), near the eventual geographical center of the plant. The primary overhead line terminates at a roof-mounted service drop structure, approximately over the truck doors, and a high-voltage varnished cambric interlocked armored cable enters the building. (For safety, the cable is jacketed with red polyvinyl.) A cable tray takes it over to the penthouse substation, through roof trusses. There's enough space in the penthouse for 35% expansion.

Roof-top central location of the substation provides the most economical distribution, with minimum voltage drop and good voltage regulation. Access is easy. And there's no ground-level installation to interfere with expansion of plant or parking lot.

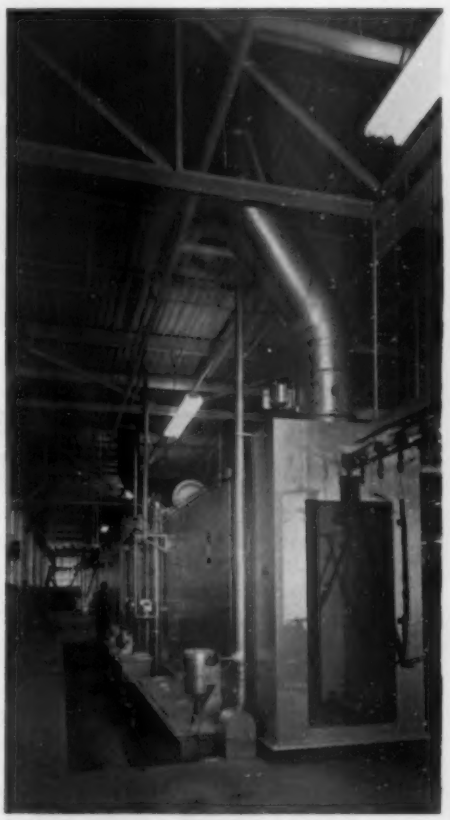


DRIVE-THROUGH RACKS hold crated pinsetters. This imaginative idea saves space aplenty, since the racks provide their own aisles. What's more, the racks will be easy to relocate when the time comes for Brunswick to carry out its expansion plans.

ROLLING CRATES for completed pinsetters are served by bridge crane and fork trucks. Note lighting, clearances.



DRIVE-THROUGH TUNNEL connects new plant with old. Vehicles and pedestrians use tunnel to cross under busy, six-lane highway. Tunnel was one of the ideas proposed by a Muskegon group that persuaded Brunswick to stay in the town.



FIXED BOOTH for painting is one of the few installations that are actually nailed down in Brunswick's flexible plant.

Plant protection headquarters and guardhouse No. 1 gleams with porcelain and aluminum.

Administration unit is U-shaped, with two wings projecting to rear and curtain wall in front.

Space-saving exterior stairs lead up east side of plant's paint department on mezzanine level.

A Beautifully Balanced Manufacturing City

TOP PLANTS OF 1960

CHRYSLER CORPORATION
Fenton, Mo.

(St. Louis Assembly Plant)

Manufacturing and Service Buildings:

ARCHITECT-ENGINEER: Albert Kahn Associated Architects and Engineers, Inc., Detroit

PRIME CONTRACTOR: H. D. Tousley Company, Indianapolis

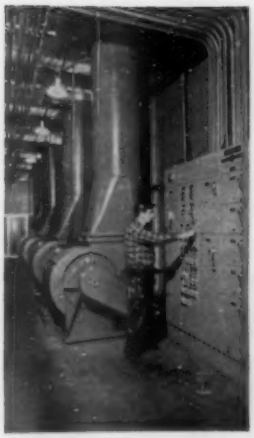
Administration Building:

ARCHITECT-ENGINEER: Sverdrup & Parcel, Inc., St. Louis, Mo.

PRIME CONTRACTOR: Fruin-Colnon Contracting Company, St. Louis, Mo.

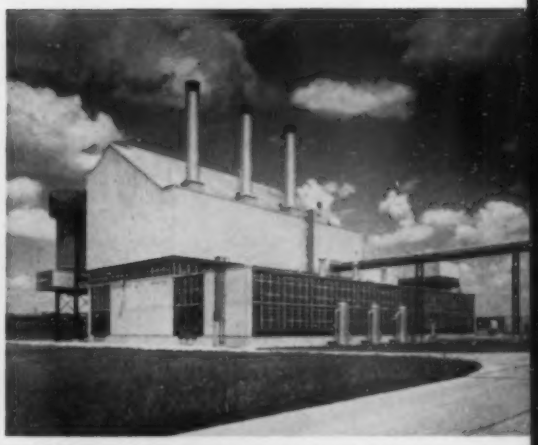
Full-color painting: page 82. Details on design and construction: page 133.

INSIDE boiler house, electro-pneumatic controls play a vital role.



INSIDE paint service area are controls for electrostatic air cleaning in spray booths.

INSIDE office building, medical center is equipped to handle emergency surgery.



OUTSIDE main plant perimeter is gleaming boiler house. Sash opens to provide plenty of ventilation in summer and to give a spacious feel to interior.

To build a $50-million, 1½-million-sq.-ft., 4000-man automobile assembly plant takes a lot of teamwork, a great deal of inspiration. To do the job as successfully as Chrysler did at Fenton, Mo., requires plenty of planning with "the forward look."

Although this isn't the largest automobile assembly plant in the world, its size is nevertheless impressive. Here are some statistics to help you grasp the magnitude of the project. The plant's 1,379,000 square feet of manufacturing space is equal to 36 football fields, including end zones. Paving materials used inside and out would make a 5-ft.-wide sidewalk, 180 miles long. The wiring and piping used in the plant would equip all commercial and industrial buildings in a typical American city of 15,000 or 20,000 people. There are nearly 9½ miles of overhead and floor conveyors, and over 28½ miles of recirculating paint lines yielding 40 colors.

A few more startling figures: It takes 125 freight carloads and 40 trailer truckloads daily to supply this plant. What does this activity produce? At present the plant is turning out 827 cars each day, and can increase to one car a minute, or 960 per day on two shifts. That's a lot of Plymouths, Dodge Darts, and Valiants to be shipped all over the south and southwest.

The most experienced automobile assembly men in the business have just about agreed that the best results are obtained from a plant that will turn out in the neighborhood of 200,000 cars a year on two-shift operation. And that is approximately what this Chrysler plant is geared to produce. Big as it is, the experts feel it's not too big; just the right size to deliver the highest quality and to operate at peak efficiency.

One of the impressions gained by a visitor is a feeling of friendliness. Though the plant is big, there's a spirit of companionship. When the new plant was relocated from two old plants at Evansville, Ind., about 150 miles away, many of the former employees thought so highly of Chrysler that they moved right along, too. To be sure, jobs were offered to those who wanted to make the move, and seniority played a large part. Nevertheless, Chrysler's working spirit of friendliness was a definite factor here. Enough people made the move to permit start-up and initial operations for several months by skilled teams. Local recruiting on a large-scale basis did not need to start for several months.

In appearance, the new plant is clean, functional, and businesslike, with few frills. Passers-by have an excellent view of the 235-acre site from famous U. S. Highway 66. Shiny aluminum siding makes the plant look as impressive as it is large.

The Chrysler people were pleased with the excellent cooperation given by the State Highway Department in improving Highway 66 as it passes the plant. It has been widened to a divided highway, and well-designed access roads make it possible to move a large volume of highway freight in and out of the plant without causing any traffic tie-ups on the main artery.

In front of the main building is a two-story administration building. It looks rectangular, with a 300-ft. front, but it's really U-shaped with its two rearward projecting wings. This building contains 66,000 square feet. It's built of reinforced concrete columns and girders, with precast concrete floor and roof decks. Atop is a penthouse for air-conditioning equipment that measures 26x110x13 feet. An elevator services the penthouse level, as well as the first and second floors. The exterior of the building has face brick on the ends and rear, with a front of handsome curtain wall—porcelain metal panels with aluminum fixed windows in continuous vertical aluminum mullions. The front entrance has an attractive precast concrete canopy.

Inside there is a 4320-sq.-ft. cafeteria, a private dining room, and a completely equipped kitchen. Food

PIGGYBACK loading docks at rear of plant handle 75 trailer-truck loads of new cars every day. Note location of boiler house (right, background) and watersphere (left, foreground).

prepared here also goes to two eating areas out in the main plant. Another feature not frequently found in manufacturing plants is the executive garage. With an unencumbered area of 10,240 square feet, it is built with huge 70-ft.-long prestressed concrete beams.

Chrysler's main building is huge: 33 bays long by 16 bays wide. With 45-ft. square bays, that makes it 1485 feet long and 720 feet wide. There is also an attached, enclosed truck dock on the rear corner of the building that holds 16 trucks at a time. Most of the plant area is single-story, except for a second floor (15 bays long by 11 bays wide) used as a spray painting mezzanine. In addition, there are four large air-handling penthouses (4 bays long by 1 bay wide) evenly spotted on the single-story part of the building. Air-handling equipment for the part of the plant under the mezzanine section is in two long transformer and fan rooms, one on each opposite long face of the mezzanine.

Framing of the assembly building is steel. The first floor perimeter, except for doors, contains three separate elements: tilt-up panels, continuous aluminum sash, and aluminum vertical siding. Some 350 panels were used for the perimeter, each weighing about 5 tons and cast on the site. Each panel measures 15 feet wide by 13 feet high, and is attractively broom-finished on the outside with vertical striations. With sturdy cement and corrosion-resistant aluminum, there's a minimum of maintenance needed. And appearance is smart, too.

Immediately behind the northeast corner of the main building is an oil and paint house. This is a small plant in its own right. It contains 26,000 square feet, and includes truck docks and an outside rail siding protected by a full-length canopy. Inside are drum storage and air-powered paint mixers. Forty colors of standard paints are continuously recirculated through 28½ miles of 1¼-in. piping, via a covered trestle leading to the paint mezzanine. There is plenty of room for more tanks and pumps for additional colors.

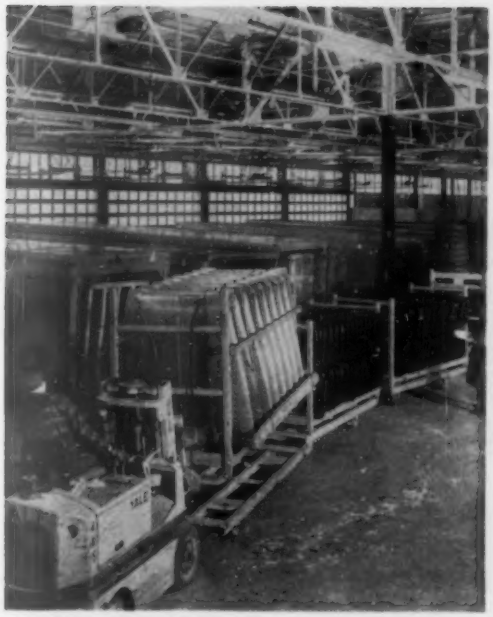
A fourth principal building in the Chrysler plant is the boiler house behind the main building. Its appearance is handsome enough to be in front of the main plant, except that it wouldn't fit in with the simple unassuming lines of that building.

The boiler house is based on the design of the main building. But the size of the equipment obviously requires a different package. Lower walls are made of tilt-up slabs, except that two panels high were used. And there is much more fenestration. The entire front wall, for instance, is made up of electrically operable aluminum sash. This gives a real feeling of openness, helps combat summer heat (see right photo, page 91).

The boiler house contains three 90,000-lb.-per-hour boilers, working at 150 psi. There's a 70-ton-per-hour coal conveying system, three 200-ton stainless steel coal bunkers, and a pneumatic ash-handling system, plus a variety of auxiliary equipment. All the principal items are highly automated with advanced equipment. Controls are electric and hydraulic supplemented by recording and indicating devices. The investment for all this was large, but there's a real payoff in smaller staff requirements and in superior efficiency.

The interior of the boiler house is spotless, even though coal is used. The building's combustion efficiency is said to be 'way ahead of its time. One reason for this is that no coal dust escapes—it gets burned first.

Material handling at this Chrysler plant is on a vast scale. Every day approximately 2000 fork-lift loads are moved out of rail cars, and 1000 trailer (4x9 feet) loads are moved from the rail docks to use points or to reserve storage points. In addition, about 3200 fork-



TRAILER TRUCK unloading dock holds 16 trailers. Unitized trailer-trains pick up loads, carry them directly to subassembly or to storage areas.

BODY BANK on the paint mezzanine stores inspected and approved bodies that await scheduling to trim department on the main assembly level.

truck moves per day are made from these tow trailers or from the reserve storage areas.

There are no outside warehouses here, unless a 300-freight car marshalling yard can be considered as a warehouse. All materials come in a steady stream from Chrysler supplier vendor plants. It takes control to build 960 cars per day of Plymouth, Dodge Dart, and Valiant lines, with choices of 32 different engines, 16 transmissions, 30 axles, 12 tires, and so on.

Here's the clincher: All these cars are assembled on one line. Not on one line for each car where it would seem difficult enough to keep the flaring fenders for that Plymouth convertible from being welded to the following station wagon, but *one* line for all cars.

Chrysler's philosophy was to install one assembly line and schedule tightly, rather than to have duplicate lines. Control has to be excellent, but capital investment operation and maintenance of the extra lines are eliminated. The resulting product mix actually gives flexibility in scheduling that didn't exist in earlier multiple-line plants. With good planning the hard jobs can be mixed in with the easy ones. That balances out the work for the crews, and it happens all along the line: in welding, soldering, painting, just to name three.

Here's another significant first for Chrysler: Piggyback transporting of automobiles was developed here at St. Louis. Working with the St. Louis and San Francisco Railroad—the famed Frisco—and with highway transporters, the new technique of trailer-rail shipments was adopted for automobiles. The piggyback method has the immediate result of increasing Chrysler's flexibility —shortening its pipelines—and in effect moves its plant closer to its dealers. (And if your sharp eyes spot a Chrysler, Imperial, or De Soto in the photograph of the piggyback yard, you're correct. The method is so effective that cars from Detroit are now brought down overland and combined with cars built here for transshipping throughout the south and southwest.)

To work out piggyback details, Chrysler leased part of its property to the Frisco (a good reason for getting enough land initially). Frisco put in spurs, switching, and piggyback loading ramps.

Chrysler's goal for its electrical system was reliability, expandability, flexibility, economy. Some highlights:

Two alternate feeders from the utility company reach the plant from opposite directions. Each 34.5-kv. feeder may be tied to either or both main breakers.

Sixteen 1000-kva. substations serve the manufacturing plant, and one 1000-kva. unit serves the office. This office unit provides an operating but easily available spare for the plant's 16 power transformers.

There's maximum ability to shift loads from one substation to another with minimum expense. And all in-plant primary 13,200-volt (as well as 440-volt and lighting) distribution is installed overhead in the factory. There are no conduits in the floor to interfere with any present or future pits or foundations.

Chrysler electrical engineers were cognizant of the industry trend toward higher kilowatt hours per unit assembled. Results of their efforts: Six single-ended substations can be made double-ended. Each switchgear can take additional feeders. Each main primary feeder can handle at least one extra substation transformer. Secondary bus duct is laid out in continuous rows, with three possible variations:

1. Isolator sections can be relocated to equalize loads.
2. New substations can be installed for load build-up; they can be fed into existing bus duct.
3. In an emergency, the isolator sections can be replaced with shunt sections of bus to permit the load to be carried by one or more adjacent substations.

TOP PLANTS OF 1960

FLICK-REEDY CORPORATION
Bensenville, Ill.

ARCHITECT-ENGINEER: Zay Smith & Associates, La Grange, Ill.

GENERAL CONTRACTOR: Flick-Reedy Corporation, Bensenville, Ill.

Full-color painting: page 82. Details on construction and facilities: page 133.

Showcase of Employee Facilities

Jet travelers flying in and out of Chicago's O'Hare International Airport glimpse this shining aluminum roof (facing page, top) just west of the runways. Their brief aerial look only hints at the exciting ground-level appearance and the fascinating features within.

Economy and imagination are the twin keynotes of this Flick-Reedy plant. Ten dollars a square foot was all it cost to provide the buildings and services, exclusive of site, landscaping, office furniture, and production equipment. Quality and quantity accompany this economy. Nothing is lacking in the plant. And here's a partial list of plant attributes to prove the point:

The plant is made up of skillfully blended, pre-engineered buildings. Heating and air conditioning are supplied by the largest industrial heat pump built to date. Water supply problems are solved by conserving every drop of rain water. Two attractive lagoons and an indoor swimming pool hold the water—and hold down fire insurance costs. Office and work areas are spacious, quickly expandable more than twice over.

The plant is air conditioned. It's all electric. There are 50-ft. crane bays and 70-ft. clear spans elsewhere. There are a combined auditorium-gymnasium-recreation room, an indoor swimming pool, a fully equipped kitchen, and a picture-window dining room. There are underfloor raceways in the two administrative bays.

For economy and imagination in construction, look at the building shell. Its 220,000-sq.-ft. floor area is contained in nine Butler buildings. There's plenty of room for expansion inside and, after that, it will be easy to extend the module buildings.

Sidewall design gives variety to the basic pre-engineered and pre-fabricated buildings. An 8-ft.-wide extension to the front building forms a corridor running the entire building length. It lends extra width to the cafeteria at the far end. Picture windows grace the outside wall of this extension. Concrete block painted in bright, colorful patterns makes up the non-load-bearing inner wall. This wall is striking to see from the highway, particularly when illuminated at night.

Another 8-ft.-wide corridor separates the two administrative bays and gives easy access to areas on each side. This corridor has non-load-bearing partitions also, but the opposite wall—facing the row of seven plant bays—is a sort of interior picture window wall that helps bring plant and office together.

Perpendicular to the two administrative bays are the seven plant bays. Not a single interior wall mars the wide expanse. There are just a few departmental partitions of wire. And the openness is enhanced by clear heights to the gabled roofs.

Economy and imagination are also evident in Flick-Reedy's approach to its water problems. The solution —self-sufficiency—was prompted by the formidable expense of installing a 2-mile water line to nearby Bensenville, plus the fact that the community system would not be able to handle the plant's water needs. Deep wells were ruled out because of the lowering water table in the burgeoning Chicago area.

Thoughtful managers with sharp pencils came up with a highly refined water conservation system, with the auxiliary benefits of good fire protection, low fire insurance rates, attractive landscaping features, and unusual recreation facilities. Here's how:

- Rainfall from 5 acres of roof and 5 acres of paved roadways and parking lots drains into a concrete pit along with "clean" water from plant cooling tanks. Water is dumped into two bentonite-lined lagoons with capacity of 1,800,000 gallons each. Chicago's annual 37-in. rainfall yields about 10 inches of water level increase in the lagoons per inch of rain. Evaporation is kept low by a film of octyl alcohol. Seepage is cut by the bentonite lining.
- The 40x60-ft. swimming pool augments the lagoons for fire purposes. A 30,000-gal. buried pressurized tank, with pumps, stands ready to serve sprinkler lines. Result: A water tower isn't needed.
- Drinking water comes from a 120-ft.-deep well with a 5-hp. submersible pump.
- Costs for this water conservation system are figured to be less than half of what a conventional system would have been for Flick-Reedy. To run the water line from Bensenville would have cost $120,000; an elevated tank would have cost $160,000, or a total of $280,000. In contrast, the principal items in this system cost only $132,000, or a saving of $148,000. (Lagoons cost $12,000; pool, $90,000; and pressure tank and piping, $30,000.)

GLEAMING roofs of aluminum are an aerial tipoff to the plant's construction. It's made up of nine standard Butler buildings. *(Photo by Chicago Aerial Industries)*

• Operating charges for lagoon-stored water are only 1/100th as much as they would be if water were purchased: ¾¢ per thousand gallons in contrast to 75¢. And electric rates are far more likely to remain stable over the years than water costs, which are more than likely to spiral.

The words economy and imagination also describe the electrical picture. This is really an all-electric plant. Because winter heat and summer air conditioning are supplied by heat pumps (see photos and text on pages 96 and 97), there's no conventional boiler room. Water is heated by electricity, too. Except for a gasoline standby generator for the fire pump, there's virtually no other source of power in the plant.

At Flick-Reedy, Btu.'s earn their keep. In the cool weather, excess heat from the heat pump keeps the swimming pool water comfortably warm via a heat exchanger. And coils in the domestic hot water tank add warmth to the tiled deck surrounding the pool.

The bulk of the daily water heating (for domestic water and parts washer) is handled on an off-peak basis. Heaters contain multiple circuits. One circuit is used during working hours. The others come on when the plant is off peak demand and when storage-tank water temperatures need to be raised.

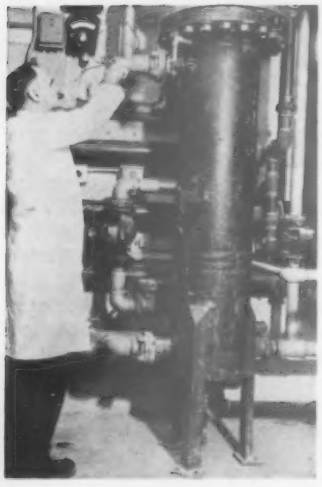
Turn the page

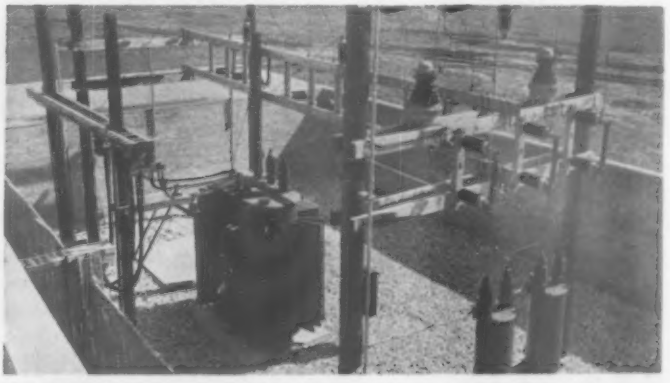
PLAY BALL—or shuffleboard or table tennis—invites this gymnasium.

THE WATER'S FINE in the plant's posh indoor swimming pool that doubles as a reservoir for fire protection. Visitors can enjoy pool view from windows in lounge.

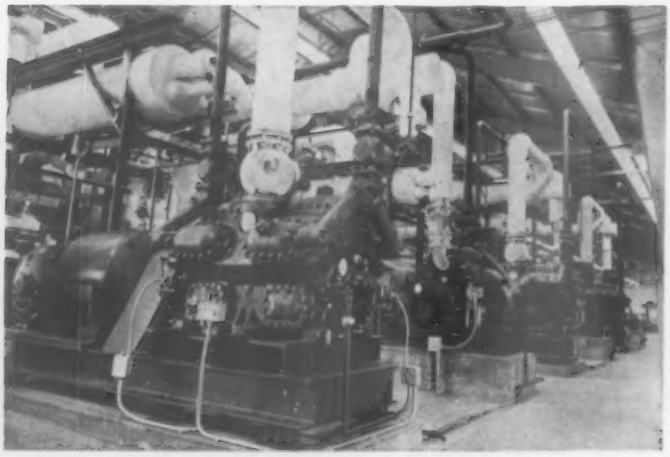
SOUP'S ON in the cafeteria, here seen at night. Windows overlook lagoon. Sliding partition (left) opens to gym.

BIG OFFICE AREAS are uncluttered by columns. Photo above shows broad expanse within one of the Butler bays. Hung ceilings support flush fluorescent lights and air-conditioning outlets. Photo at left shows individual offices that are arranged along the periphery of main office area. Plant and office people are easily visible to each other through a common wall of picture windows.





BIG ELECTRIC POWER usage at Flick-Reedy (considering plant size and product) is the result of all-electric plant. There's room for additional transformers and for alternate feeder in the fenced enclosure shown in photo above. At left is master electric water heater in basement beside swimming pool.



BIGGEST HEAT PUMP (photo above) is located near an outside wall. Evaporative condensers, open to the outdoors, give up heat in summer, take in heat from winter air for heating. Minneapolis-Honeywell Supervisory DataCenter (left photo) is the control device used for these huge 640-ton York machines.

PEAKED BAYS of the seven manufacturing buildings carries service piping, air-conditioning ducts, lighting, and crane supports. No partitions hamper the easy flow of traffic. Note insulation under the roof.

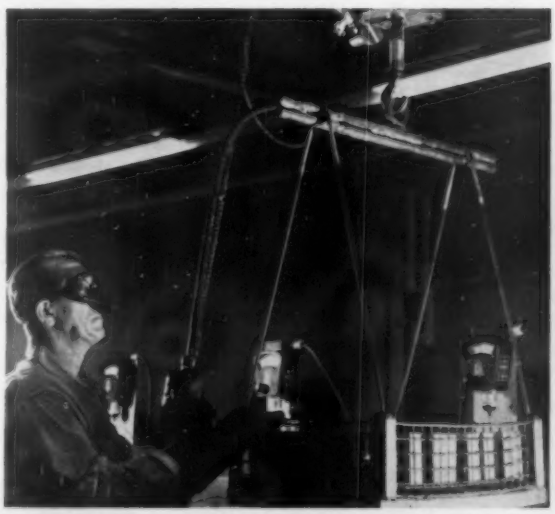
. . . FLICK-REEDY CORPORATION

The photos on these pages, like those preceding, also reflect the principles of economy and imagination. As in their tackling of building construction and water conservation, Frank Flick (president of Flick-Reedy) and his able staff enjoy challenging conventional ways of doing things. If a conventional product or technique was proven best after investigation, they used it. If not, they found something better. For instance, office partitions are framed with extruded aluminum, and the bottom half of each panel is made from half of a stock hollow-core door.

In another dramatic example of ingenious design, Flick-Reedy collaborated with York and Minneapolis-Honeywell to install the largest air-to-air industrial heat pump yet built. This took some doing, for heat pumps haven't been generally accepted in northern climates such as Chicago, with its wintertime design temperature of minus 10 F. But by adopting compound—or multi-stage—compression, enough heat can be extracted from sub-zero air to make the heat pump principle effective without supplementary heating.

Because it's a pioneering installation, the Flick-Reedy heat pump equipment is carefully instrumented. The electric utility company, of course, is watching the power requirements with respect to degree-days. York engineers report that original computations were on the conservative side—the system is working better and more efficiently than expected.

Some of the many fine features of this plant are on permanent display in part of the company training room (lower right photo). Many of the outstanding construction details are portrayed, either in photographic or sample form, to help present employees—and prospective ones—understand why the various plant decisions were made. Increased company pride and higher morale result from the story told here.



PLATING TRAYS are lifted by home-made devices that utilize the hydraulic cylinders (top right of photo) made in the plant.

CONSTRUCTION DISPLAYS in training room tell employees and visitors the story of the plant and materials it's made of.

OUTDOOR BEAUTY surrounds entire plant on site overlooking woods and tree-lined river. Gleaming glass-walled perimeter provides outdoor view for every office along wall.

OUTDOOR BEAUTY is surrounded by glass-belted walls of interior court. Court ensures permanent view for interior offices regardless of perimeter expansion of the building.

TOP PLANTS OF 1960

G-V CONTROLS INC.
Livingston, N. J.

ARCHITECT-ENGINEER: Frank Grad & Sons, Newark, N. J.

PRIME CONTRACTOR: Wm. L. Blanchard Company, Newark, N. J.

Full-color painting: page 82. Details on construction and facilities: page 133.

Gem of a Plant in a Perfect Setting

When it burst out of rented quarters in East Orange (N. J.) and moved into its own sparkling new building in nearby Livingston, G-V Controls Inc. came up with many delightful answers to the problems of small plants. Here are a few of the new plant's attributes: excellent site selection; future expandability with present economy; built-in scenery, via an imaginative courtyard; plenty of plant services for production as well as research and engineering needs.

There's nothing particularly gold-plated here. Elements are put together simply, but with an unusual, colorful, and inspired flair.

To obtain future expandability and yet retain a fine view from much of the plant, G-V adopted an interesting technique. Its building was placed further back than the usual construction site. Expansion will be forward and to one side. To accommodate frontal expansion at no sacrifice to beauty, G-V built a compromise front wall, which is attractive and inexpensive. When expansion does drive the plant forward (there's plenty of space for all future needs), the then-appropriate entrance and exterior treatment can be added.

One goal at G-V was to provide attractive surroundings for engineering and technical people. Because the property borders on a pleasing tree-lined river, the entire wall facing the river has plenty of full windows. What about the people whose desks and offices don't face the outdoors? They've not been overlooked: A handsome interior courtyard sits smack in the middle of the office area. The court measures 44x66 feet, and is attractively landscaped with pools, fountains, architectural lanterns, and several species of trees.

With nature so close at hand, from both the building perimeter and the courtyard, all general, executive, and private offices are tastefully decorated with colors and materials that take their hues from the outdoors.

OUTDOOR BEAUTY of countryside or interior court forms living mural for all general and manufacturing offices in new plant.

OUTDOOR BEAUTY becomes impressive, restful vista for private work and guest conferences in president's wood-paneled office.

Outside, cream-colored brick, aluminum-framed windows, and turquoise aluminum panels create a clean, simple appearance around the whole perimeter.

The new plant is designed to house the company's entire corporate organization. Manufactured products are precise electronic components: relays and thermostats. They're small, and the operation is mostly clean bench assembly work. Factory structural requirements are not severe. Because of the highly technical nature of the product, about half of the plant space is taken up by laboratories and offices.

Abundance of natural light was a goal. With both the perimeter and the court to draw on, no desk or office is more than 20 feet from a view of the open sky.

Located in the office sector of the plant is the lobby (with receptionist and telephone equipment room), small interview room, and small washroom. Working clockwise around the building, there are a conference room, president's corner office, general offices, and engineering department offices in the rear (north) corner. Research and development occupies the remaining portion of the north window wall in the office-half of the building. Completing the circuit, there are a lab and a factory office, both facing on the interior court.

The opposite half of the building proper is devoted to manufacturing. Except for a block-walled island for painting and soldering, the entire area is open. Atmosphere here is bright and airy. The area includes: small shop office, stock room, machine shop, inspection, shipping and receiving, and light bench-work area. All services are contained in a utility wing that projects from the rear of the building.

Turn the page

OUTDOOR BEAUTY of river-edge public park, just beyond the plant property line, floods one wall of this pleasant employee cafeteria. Dining area is tastefully decorated in flame, charcoal, and white. Dining terrace is just outside.

OUTDOOR BEAUTY becomes a luncheon partner when mild weather makes dining terrace a must. Picnic area is beyond terrace.

. . . G-V CONTROLS INC.

CRISP, tailor-made plastic trays make a snap of handling small electronic relays. Turn trays one way, they stack—turn 'em the other, they nest for storage. Scene: inspection and shipping area at rear of plant.

COOL air for hot summer days, warm air for the long winter, is supplied by this air-conditioning equipment. Entire unit is housed in strikingly designed penthouse atop plant. One multi-zone blower serves offices, other serves the shop area.

Working areas in the manufacturing portion of the plant are clean and bright. Even though the coil-winding operation doesn't require strict "white room" standards, the cleanliness achieved here is admirable.

Factory walls, of concrete block (behind the cream-colored exterior brick veneer) are painted bright and light colors, coordinated with the rest of the plant. Same colors are used on work benches, chairs, accessories.

The entire building is air conditioned, except for the small boiler room and an island housing paint spray and brazing rooms. Air-conditioning equipment is in a penthouse big enough for first expansion needs. This penthouse is aesthetic as well as utilitarian: Contrasting color and texture of its aluminum siding add interest to the otherwise flat roof line.

Expansion will come easy at G-V. There's plenty of room right now. So when the first expansion takes place, the office can spill over into part of the present manufacturing space—if necessary—because the common interior walls are made of thin block or of portable metal. The only fixed item on the production floor is the painting and brazing area.

Flexibility is built-in, too. Work benches can be easily moved. Power taps are made from overhead raceway ducts. Lighting, which varies from 65 foot-candles to 100 and 150, can be altered or supplemented via plug-in trolley ducts. Apart from basic assembly operations, other areas—stores, testing, and shipping—are similarly flexible. They're bounded by wire partitions.

One key to G-V flexibility and expandability is that

CLEAN, almost "white-room clean," is this benchwork manufacturing area in G-V's new plant. Gleaming floors, excellent lighting, comfortable air conditioning, restful colors, and plenty of room to move around make this area an ideal work place.

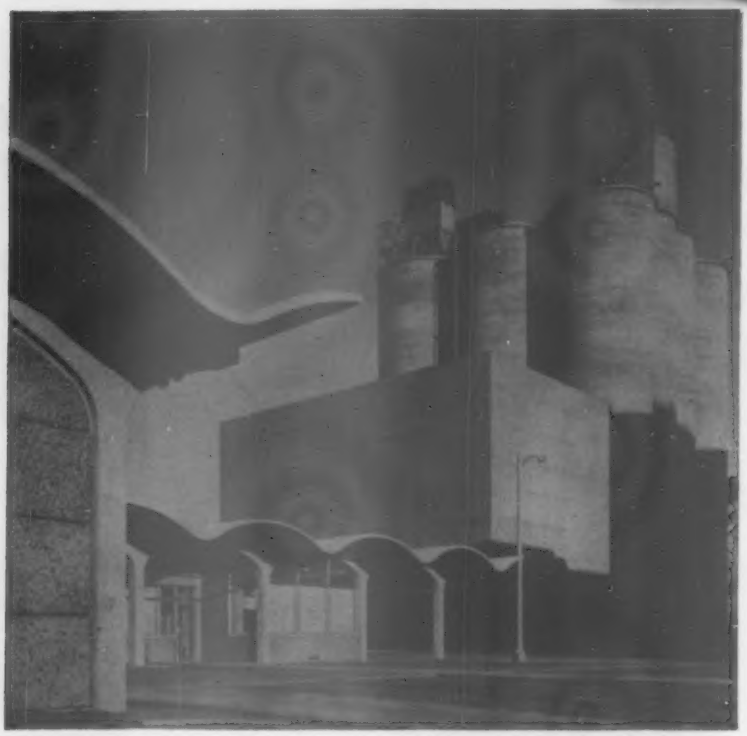
principal fixed facilities of the plant are spotted in a rear utility wing. For example, here are the dining room, kitchen, dispensary, boiler room, washrooms, and maintenance room. They're spotted along a wide corridor that runs from front to rear and exits at center of the parking lot. There's no locker room as such. Combination locker and coat racks line one wall of this corridor.

High point of the utility wing is the 2000-sq.-ft. dining room. A pace-setter for many new plants (some still fail to take full or even partial advantage of scenery outside), G-V's full window walls perpetually embrace the four seasons. In pleasant weather, employees can dine at picnic tables on the dining terrace.

In the corner of the utility wing, opposite the kitchen, is an unmanned boiler room. In addition to the 70-hp. low-pressure hot water unit now installed, space is provided for a second boiler. Heating water is pumped up to the penthouse air handlers and to hot-water convectors under selected windows and walls in office and shop sections. Refrigeration equipment for the air conditioners is also installed in the boiler room.

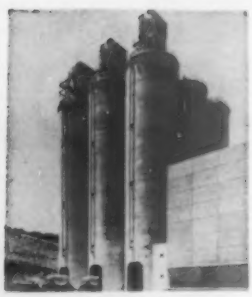
Adjoining the entrance to the service-wing corridor, next to the walkway to the parking lot, is a trim and well-equipped dispensary. Medical area is large enough for a considerable increase in plant size. At present it's staffed only on call by first-aid-trained employees, and a local doctor is summoned for more severe emergencies. Dispensary has private toilet, examining table, treatment chair, and ample first-aid supplies.

CONVENIENT trolley duct makes it easy to add or change shop lighting when plant needs vary. Same convenience for power changes results from raceway duct at front of column.



GRACEFUL FORMS—curves, blocks, and cylinders—make up the plant complex. Administrative, production, storage, and service buildings are separate, yet hold firmly together by strength of design. Block building houses packaging lines.

Three 75-ft. prestressed beams bridge a 225-ft. distance, carry conveyors.



Nine silos, four interstices, hold 169,000 bbl. of cement.

TOP PLANTS OF 1960

IDEAL CEMENT COMPANY
Tijeras, N. M.

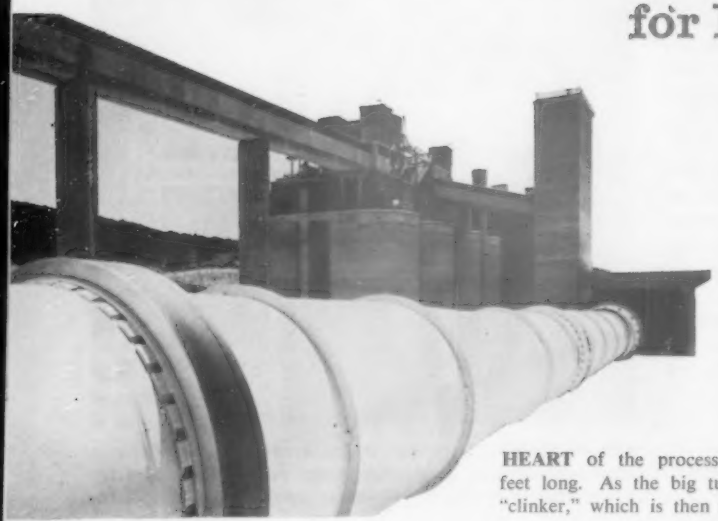
Gracefully Composed for Efficient Production

ARCHITECT: Ferguson, Stevens, Mallory and Pearl
Albuquerque, N. M.

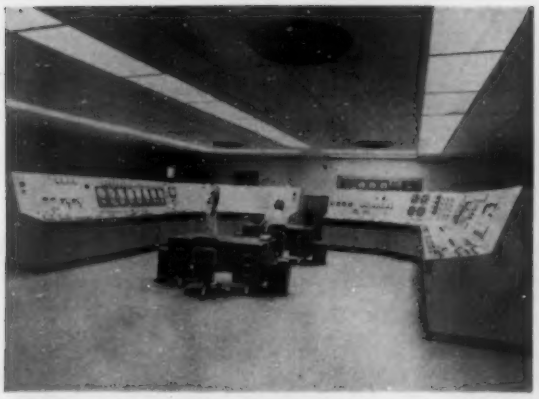
ENGINEER: Ken R. White Consulting Engineers
Denver, Colo.

PRIME CONTRACTOR: Robert E. McKee General Contractor Inc.
El Paso, Tex.

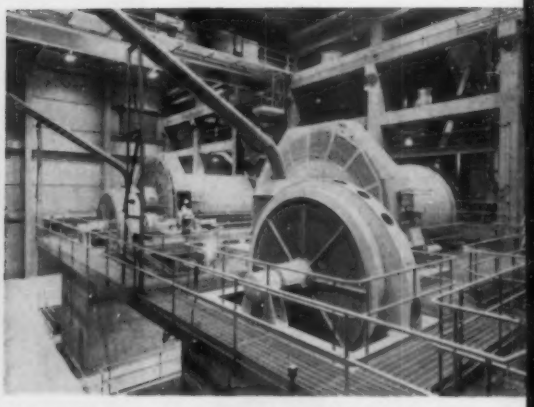
Full-color painting: page 83. Details on construction and facilities: page 133.



HEART of the process is this rotating kiln. It's 11 feet in diameter, 375 feet long. As the big tube rotates, raw material is fired at 2750 F. to form "clinker," which is then ready for grinding and screening into finished cement.



BRAIN of the operation is this highly instrumented control room. From here all plant equipment is watched and controlled. Operators scan flames in kiln via closed-circuit TV.



MUSCLE for grinding mills is supplied by 1250-hp. motors. Except for a few items, such as steel gratings and railings, entire building is concrete.

Nine miles east of bustling Albuquerque, on Route 66, stands Ideal Cement's attractive new plant. Unlike most cement plants, there is no fume-spewing tall stack to contaminate the countryside. Unlike most cement plants, the buildings and grounds are amazingly clean. The modernistic functional shapes that make up the plant complex are easy to look at, easy to work in, and easy to maintain.

The company has done wonders with concrete. It has used concrete in almost every conceivable shape and form. Plane and curved surfaces predominate—in bold block buildings, sturdy cylindrical silos, and graceful barrel roofs. Forms of concrete used here include thin shell, precast, prestressed, block, slip-form, and poured-in-place.

You'd expect to find—and do find—concrete widely used in the plant's footings, foundations, floors, walls, and roofs. But here are some less common applications of concrete by Ideal: building columns, roof beams, crane runway beams, conveyor belt bridge, light poles, and fence posts. Even the flagpole is made of precast reinforced concrete.

The plant's flat roofs are of prestressed, precast double-tee sections with parapet walls. Lightweight concrete slabs, 2½ inches thick, rest on the tees, to seal and insulate. Four-ply built-up roofing completes the job.

Three structures—kiln, maintenance, and administrative buildings—have graceful thin-shell barrel roofs. These were cast on forms on the ground, then hoisted into place. Except for the kiln building, the 3-in.-thick roofs are covered with 2 inches of rigid insulation, a built-up roof, and marble chips. Widths of the barrel sections vary from building to building: 18, 20, and 22 feet. The longest span is 58 feet. For appearance and sun-shading, each barrel overhangs the building at either end, and half-shells cantilever out at each side.

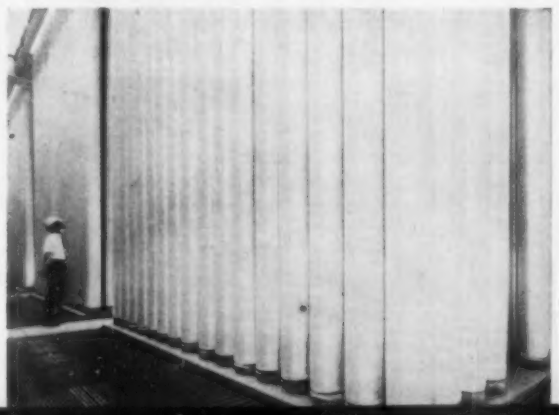
With the growing interest of the public in air pollution control and with the dollars-and-cents payback of lower maintenance and higher morale, Ideal went all out in striving to lick its dust problems. The result of its efforts is a plant that's a good neighbor from the outside, and a good employer on the inside. It cost real money: Over $1.5-million is invested in 32 different bag and other dust collection units. But the company is already reaping a practical return in the comparatively low maintenance costs of its sensitive, expensive equipment.

Most dramatic of the bag filters is the huge complex shown below. This baghouse handles the hot effluent gases from the 375-ft. rotary kiln. Nearly 1300 silicone impregnated woven glass filter bags, 12 inches in diameter and 25 feet long, separate the dust from the hot exhaust after large particles have been extracted by a cyclone collector.

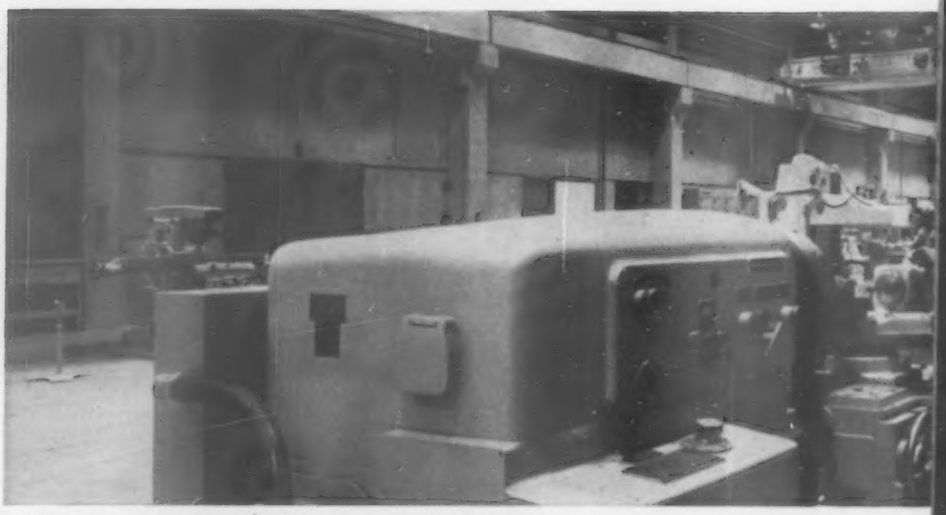
Dust control of another type is guaranteed in the highly instrumented control room shown above (left). This room is situated in the same building as the kiln discharge and the grinding mills (photo above, right). Air conditioning and pressurization, using highly filtered air, answers the dust problem here. Double glazed picture windows and vestibule doors, with vinyl tile floors, complete the dust control measures. With round-the-clock operation seven days a week, downtime in this critical room due to dust would create a painful situation.

Turn the page

LUNGS of glass cloth (1280 of 'em, more than two acres of dust-trapping surface) filter hot fumes from kiln. Result: There is no towering stack to pollute the Tijeras countryside.



. IDEAL CEMENT COMPANY



MAINTENANCE BUILDING is efficient, graceful, and comfortable; equipped with infra-red heaters, mercury vapor lighting. Its flowing roof is made of thin-shell concrete.

ENTRANCE CORRIDOR from parking lot has walls that are an extension of the outdoors. Made of lightweight concrete panels, they create a distinctive, modern effect that's as practical as it is attractive. Tile floors of corridor are easy to maintain.

ADMINISTRATIVE BUILDING capitalizes on the beauty of the flowing roofs used extensively at Ideal. There's a 10-ft. roof overhang outside these office windows. Contour is attractive inside, too. Walls and floors are in bright pastel colors.

LUNCHROOM is located in a bay of the administrative building. Picture windows look out on the rugged slopes of the Sandia Mountain range. Plenty of room for growth has been allowed here, as in other areas of the offices and plant.

WASH AND CHANGE ROOM is spacious, well lighted, easy to clean. Floors are of quarry tile, with ceramic tile in shower room. Partitioned walls are of pastel "Spectra-glaze" concrete block. Smaller washroom for supervisors is across the hall.

Maintenance is given plenty of attention at Ideal. The tough task: to keep the plant running 24 hours a day, week in and week out. The job is particularly difficult in this geographic area, since it isn't heavily industrialized. Ideal can't run to a supply depot for parts or equipment. Accordingly, maintenance is well staffed, well equipped, and well stocked.

The maintenance building is handsome. From the outside it's as attractive as a plush motel, with curving roof and striking concrete wall panels. Inside (photo above, center) the building is roomy, airy, well lighted, pleasant.

Expandability is planned into the building, with plenty of room for years ahead. Flexibility is engineered in—with an electrical network cast into the floor. Conduit and junction boxes are gridded on 11-ft. centers with outlets spaced every foot.

The maintenance crew seems to pace the production crew in housekeeping. The electrical repair shop looks as immaculate as a doctor's examining room, and the rest of the shop areas aren't far behind.

"Well staffed" doesn't necessarily imply quantity. Ideal is a well-instrumented, minimum-manpower plant. Here's one maintenance example to show how well organized its departments are: Two salaried and two hourly people handle over 150,000 stores items. Shelves, bins, and drawers are as neatly arranged as in a new retail store on opening day. And they stay that way.

Low-cost maintenance was designed into Ideal's plant. Here are eight examples:

1. The sturdy properties of concrete promise years of service at almost zero maintenance expense.

2. Windows won't be much of a maintenance problem. Except for the administrative office, there's hardly any glass in the plant.

3. The protective shelters on top of the silos are built of maintenance-free green plastic corrugated panels. They give natural light to the conveyor machinery, and the bright green panels add a note of color to the light gray concrete structures.

QUALITY CONTROL LAB houses complete chemical and physical test equipment (bottom photo). Lab's vinyl floors, and glazed concrete block walls (top photo) are easy to maintain.

4. What little exposed steel there is in the plant is carefully painted in accordance with a company-wide schedule designed to test out different paints for different applications and conditions.

5. Equipment maintenance is aided by an automatic lubrication system that's at work on the kiln, the mills, and all the conveyors.

6. There's lots of room around each machine for easy maintenance accessibility. And for just plain walking through, there's vertical clearance everywhere with no stooping, even with hard hats.

7. All electrical switchgear and control equipment for the plant is housed in four pressurized equipment rooms. Incoming air is filtered. Filtered air from the pressurized rooms is fed into the plant in cold weather, bypassed to the outdoors during hot weather.

8. There's an electrical interlocking system for detecting equipment failures and shutting down malfunctioning units before serious damage occurs.

TOP PLANTS OF 1960

KENNECOTT REFINING CORPORATION
Anne Arundel County, Md.

(A subsidiary of Kennecott Copper Corporation)

ENGINEER: Western Mining Divisions, Kennecott Copper Corporation, Salt Lake City, Utah

ENGINEER-CONTRACTOR: The M. W. Kellogg Company, New York

Full color painting: page 83. Details on construction and facilities: page 133.

POWER Dominates These Ample Acres

In its powerful architecture, process, and equipment, Kennecott Refining Corporation's new plant reflects the direct strength of the basic metals industry.

Situated on the navigable Patapsco River south of Baltimore, this electrolytic refinery can produce 16,500 tons of high-purity copper monthly—for the nation's wire, cable, pipe, tubing, and allied industries.

This is a plant that's truly designed for the long haul. The production equipment is carefully engineered, sturdy, easily accessible for maintenance. Buildings and services are also well-tailored, promise to serve with a minimum of maintenance. For example, the production buildings are made of concrete slabs on steel framing. Except for some painting of the interior steel, and occasional attention to entrances, maintenance dollars will be a small figure in the budget.

The 5x20-ft. wall slabs—shown in several photos on these four pages—are sealed against the weather with rubber-based calking. Windows will give no trouble, either. They're of corrugated plastic panels, 'way up at the roof line.

Appearance of these buildings is simple, clean, uncluttered. Close up, the individual panels have character cast in, having been poured on ribbed rubber matting with the ribs running vertically. Farther off, the buildings gain striking accent from the bold band of bright blue-green perimeter window ribbons just below the roof. The roofs themselves are made of precast prestressed concrete panels, welded to the structural steel trusses. They are insulated with fiber glass or foam glass and covered with built-up 20-year bonded asphalt roofs, gravel-covered.

Even though each is a special-purpose structure and has a varying shape, the several production buildings

WHITE concrete block walls accent the administration building's clean, free lines.

LIGHT comes into building through two soaring window walls facing each other.

BRIGHT lobby features a hanging stairway, radiant heat, bronze rail and trim.

Heart of the giant copper refinery is the group of five huge production buildings of maintenance-free tilt-up concrete slabs. There are eleven auxiliary and administrative buildings. Planning was keyed to expansion; each building can grow 100%.

attain homogeneity by the similarity of bold rectangular design and by the repetition of materials. The refinery is not simply a process plant squeezed into a conglomeration of shelters.

Expansion promises to be a snap. Main and auxiliary buildings are each positioned so expansion can take place in two directions. And floor grades are uniform. This would permit the three principal buildings to be joined, if it became necessary. Appropriate footings are strong enough for the additional column loads.

The four administrative buildings present an interesting combination of similarities and contrasts to the group of production buildings. Similarities: All are rectangular, concrete, widely spaced, low-slung. Contrasts: Administrative group is white instead of gray, with windows instead of plain walls, concrete block instead of panels. Architecturally, the two groups of buildings belong together; functionally, they're obviously separate, even at first glance.

The administrative foursome—main office, laboratory, industrial relations, combination gate and change house—are fireproof, like the big backdrop buildings. But the cheaper construction of concrete blocks is used for sidewalls. There's no feeling of stark plainness, however, because in each building the block appearance varies either in masonry or in finish.

The left half of the laboratory, for instance, with no windows in its front wall, is adorned with three geometric rows of slightly projecting block, painted pastel in contrast with the pure white wall. The high-windowed change house has three rows of painted block in a different pattern. The two wings of the two-story main office are built in a colonial blockhouse fashion, with a pronounced overhang of the upper story.

In the handsome entrance to the office, full-height plate-glass walls in front invite the visitor's eye into the attractive foyer and the bronze-railed second-floor corridor. And the broad window wall at the rear quickly orients the visitor to the massive production buildings across the lawn. Farther out, there is the impressive scenery on the shore of the Patapsco River near the head of Chesapeake Bay.

Interiors of the administrative buildings carry out the impressions of the exterior: well lighted, neat, efficient. Offices are pastel-painted block, accented simply by a wooden chair rail. Everything is gaily done in light colors, with no dark or gloomy corners.

The basement of the administration building houses storage rooms, the main telephone equipment room, lunchroom, and air-conditioning equipment area. A dumb-waiter goes from the storage room to the electronic data processing room for easy handling of cards.

Out in the plant buildings, much the same atmosphere of good lighting and good housekeeping prevails. Mercury-vapor fixtures, augmented by the sky-lighting of continuous ribbon strips of corrugated plastic, contribute toward good housekeeping and neatness. Kennecott's clear interiors, with virtually no interior partitions, aid lighting and cleaning.

Stored items have their own separate buildings behind the big ones, out of the way of expansion. Fire brick, for instance, is kept in a building of white-painted block, with palletized storage and easy loading docks.

Turn the page

UNDERSLUNG carriers take over the majority of handling, a task usually done in older plants by narrow-gage railroads with their inherent headaches.

OVERHEAD crane loads 300-lb. cakes of blister copper that have just arrived from South America. These are moved by rail to the building in the rear for casting into workable anodes. All the production buildings are built of tilt-up slabs, and have precast, prestressed concrete roof panels and handsome plastic panels at their roof lines.

In its new plant Kennecott made a bold departure from accepted material-handling practices in the industry. Elsewhere, narrow-gage railways transport much of the heavy material. But at Kennecott huge lumberyard straddle trucks grab bolsters of copper forms, transport them swiftly from one building to the next. Gone are the problems of rolling stock and of rail and switch maintenance. Instead, smooth floors and paved yards make mechanical sweepers more effective, enable conventional fork trucks to carry their loads smoothly.

Both straddle and fork-lift trucks are assigned to their jobs by a dispatcher with a radio.

For a 'round-the-clock refining process, maintenance facilities must be good. And good they are at Kennecott. The 20,000 square feet of maintenance area attests to that. The machine shop occupies slightly over a quarter of the maintenance building space. Blacksmith, pipe, carpenter, and electric shops are the other main craft groups located here.

Fifty-foot cranes service each of the two bays of the maintenance building. There's plenty of room for expansion within. After that, the building can be enlarged by extending each end, following the pattern of the production buildings.

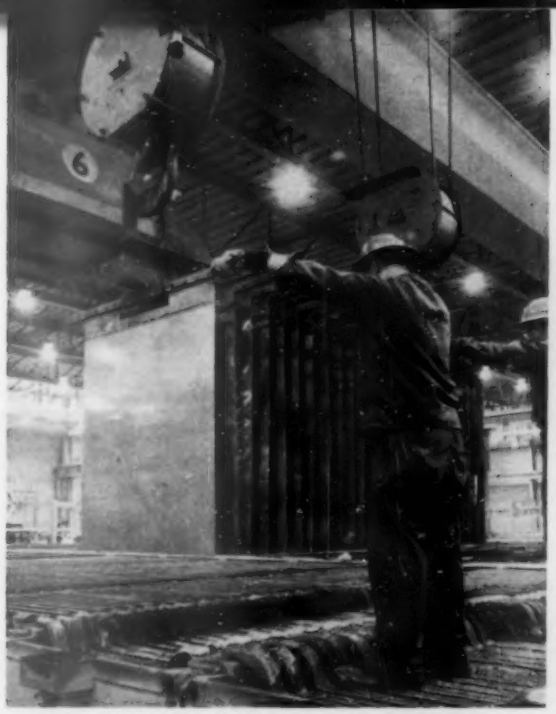
The maintenance building is virtually self-sufficient. Between the two work bays is a two-story service core. The expandable toolroom is on the ground floor, together with special shop areas. Upstairs are vending-machine lunchroom, washroom, utilities, and offices.

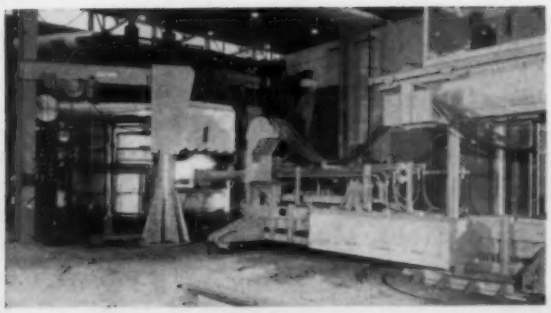
Perceptive planning and wise buying are paying off for Kennecott. Here is an example from each of the three major operations at the refinery:

• First important step is the melting of raw material

SPACIOUS maintenance building occupies 20,000 square feet, is built in the same style as the production buildings: 5x20-ft. precast concrete panels on steel framing. Two high bays, like the one in the machine shop above, straddle a service core.

TIDY toolroom on ground floor of service core can support a mezzanine level above cabinets when growth calls for one.





CHARGING preheated copper cathode into huge electric arc furnace, this machine can also pivot to serve to preheating furnace. Note the plastic windows.

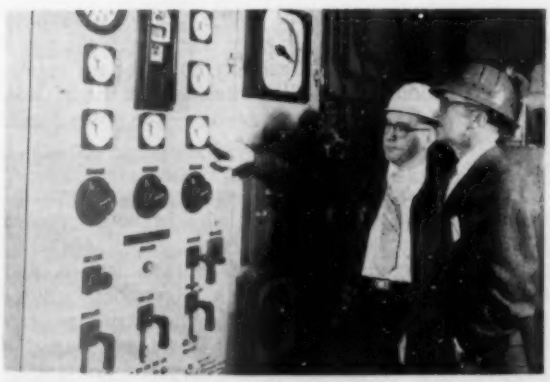
LOWERING copper sheets, workmen guide "starting blanks" into electrolyte tanks. For 24 hours, these blanks hang between 99.4% copper anodes, pick up ions from the acid solution, then emerge as 99.95% copper cathodes for casting into wire bars.

SHIPPING starts here, as final product gets weighed before being sent out by ship, truck, or rail to fabricating plants. It takes this huge plant to refine out about ½% of the impurities.

"blister" cakes in reverberatory furnaces for casting into anodes. Waste heat from these furnaces supplements natural gas for supplying heat to the plant boilers for the production of process steam and comfort heating steam. And, logically, the boiler room is atop the anode casting building.

• Second step is in the electrolytic refining of anodes to the purer cathodes. Direct current for electrolysis is delivered through silicon semi-conductor rectifiers. These silicon installations are among the first to be used for large industrial rectification jobs.

• In the third step—the "fine" casting of cathodes into marketable shapes—mechanization has reached a high degree of efficiency. The pivoting charger (right photo, above), with its operator in the glass cab, serves both a huge preheat furnace (not shown in photo) and the electric arc furnace.



MASTER CONTROL panel for electric arc furnace charts power input and metal bath temperature as well as output. It also regulates transformer taps. Incoming voltage: 34.4 kv.

QUALITY CONTROL lab, part way between administration building and tank house, monitors refining steps and maintains precious metal inventory records of by-product sludge.

TOP PLANTS OF 1960

ROYAL McBEE CORPORATION
Springfield, Mo.

ARCHITECT-ENGINEER: Giffels and Rossetti, Detroit

PRIME CONTRACTOR: Huber, Hunt & Nichols, Inc., Indianapolis

Full-color painting: page 83. Details on construction and facilities: page 133.

Image of a Colorful, Sophisticated Product

"Image of a colorful, sophisticated product." This analogy for Royal McBee's new typewriter plant is true in several ways: The outside of the package is low, colorful, sleek, uncluttered. The inside is skillfully packed with an integrated variety of familiar and special machinery and equipment.

The plant rests far back on a large site at the edge of a residential area. Physical appearance and landscaping were tailored to complement the surrounding community. Boiler house and ground storage tanks are out of sight at the rear. All unpaved areas are planted with fine lawn and meadow lawn. There are seasonal trees and evergreens and low plantings of juniper, myrtle, and honey locust around the office. Perimeter expansion won't affect wooded areas around plant.

Outside, the "T"-shaped office wing gleams with an extruded aluminum-frame curtain wall of spandrelite and gray-tinted glass. For accent, the curtain wall sits about three feet off the ground on a foundation wall of recessed concrete.

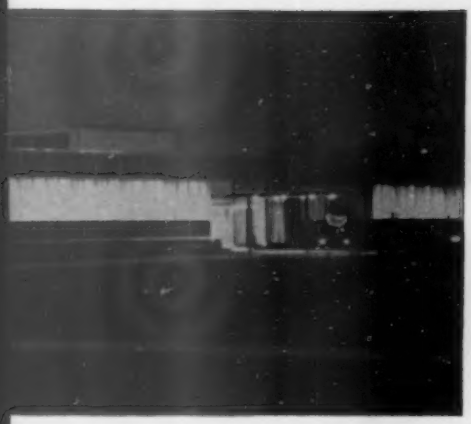
Inside, the office wing is bright, cheery, and colorful. Many partitions are movable white fiber glass panels with aluminum trim. Modular desks have glare-free Formica tops. For color accent, 10x10-in. concrete support columns are painted a soft orange.

The front left end of the office "T" accommodates a light and airy cafeteria. The dining area is at the very end, with full-length glass window walls on all three sides. And there's outdoor access for pleasant-weather eating. A complete kitchen occupies the adjoining "T" link between office and plant. It doesn't interfere with the cafeteria view, and its handy private receiving apron and dock is recessed out of view from the main road in front of the plant.

In the cafeteria, plastic contour chairs in pastels, Formica-topped aluminum tables, and all-stainless serving lines are attractive and easy to maintain. A battery-operated floor maintainer wet-cleans and dries the durable vinyl tile floors (photo at right).

The right end of the office wing is reserved for expansion. Space is available for more than double the office size. The same planned flexibility holds for the manufacturing building. By adding increments at the left and the right, its area can also be doubled. The boiler house at the rear is similarly expandable.

Within the spacious 266,000-sq.-ft. rectangular manufacturing area, four service islands or cores provide housing for auxiliary plant services. Each 40x80-ft. core on the ground-floor level contains lockers and toilet rooms for men and women. Restroom facilities feature wall-hung toilets, ceiling-hung partitions, circular washbowls with liquid and powdered soap dispensers, ceramic tile walls, and terrazzo floors. To prevent settling cracks in the terrazzo and provide access to piping and wiring, the service core floors are built over reinforced concrete crawl spaces.



DRAMATIC SIMPLICITY of line and form prevails throughout plant. At twilight **(left)** camera catches full sweep of long, low glass and aluminum façade. In sunlight **(above)** soaring entrance overhang is bold complement to gleaming gray glass and spandrelite curtain wall. In soft indirect lighting **(right)**, clean, uncluttered main lobby reflects sophisticated design of façade, that will stay modern for years.

DRAMATIC SIMPLICITY of plant is also reflected in spacious cafeteria where stacked aluminum and fiber glass chairs create a flowing pattern against the broad drape-covered window wall.

On the mezzanine levels of the four cores are transformers, substations, domestic hot water sources, and air-conditioning rooms. All fans are installed on vibration mounts or vibration pads.

Plant maintenance gets "royal" treatment. Its 70-man crew (including janitors) occupies 13,200 square feet in the northeast corner of the building, near the short link connecting manufacturing to the boiler house. In this corner location, maintenance men enjoy a fine outdoor view through two generously glassed walls. The corner spot also places maintenance out of the clockwise flow of product traffic, yet quickly available to areas of maximum maintenance needs.

To produce the energy required for operating and air conditioning the plant, a 90x83-ft. two-story boiler house sits at the right rear of the manufacturing building. Except for the absence of perimeter windows, the construction of the boiler house is identical with that of the main building: dark orange face brick on lightweight block, topped with insulated, corrugated aluminum siding, textured to reduce glare. Two 36,000-lb.-per-hour boilers furnish the comfort and process heat. There are 1300 tons of refrigeration for summer air conditioning of virtually the entire plant. Cooling towers are located on the roof, to avoid interference with expansion.

Among many auxiliary services quartered in the boiler house is the fire protection system. At its heart is an electric fire pump, with a diesel pump on continuous standby. Nearby is a ground storage tank. Adding considerably to fire protection is this arrangement: Royal deeded an acre of its property to the City of Springfield for use as a fire station site. Royal and the surrounding area benefit from this added protection.

Flow of materials at Royal makes a fascinating story from the standpoint of both layout and techniques. Raw materials enter near the rear left corner of the plant and travel clockwise around the whole building, leaving as a finished product at the same place they enter. The operation is almost completely integrated, with almost every fabrication step handled in the plant. Except for a few items—such as type faces (which come from the main plant in Hartford, Conn.) and special tiny springs and carrying cases—each of the nearly 2000 parts of a portable typewriter is fabricated in the Springfield plant.

Turn the page

. . . ROYAL McBEE CORPORATION

ASSEMBLING portable typewriters requires a minimum of handling, thanks to system of seven roller-coaster conveyors. Conveyors dip at each assembly station. Operators just remove or replace unit without leaving area. There's seldom even a truck to obstruct the aisles here.

MOVING heavy machine stock is simplified by use of these strategically placed jib cranes. Fluorescent paint band on the support column marks fire extinguisher. Note acoustic ceiling and vibration mounts.

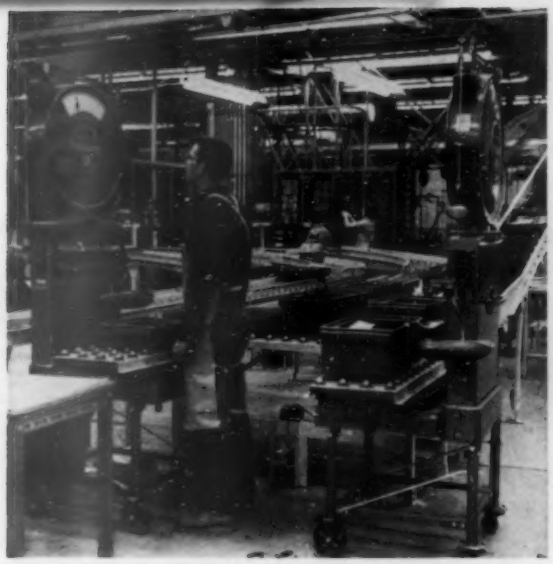
This arrangement makes for built-in quality control and indicates that Royal pays particular attention to achieving the best in material-handling methods.

Roughly one-half of the manufacturing operation consists of screw machine, blanking, secondary punch press, milling, drilling, tapping, and reaming steps. These departments are placed in line around part of the plant perimeter. Parts can progress directly along this line. But, in most cases, they are diverted into a central finishing core for one or more intermediate steps of heat treating, tumbling, plating, or painting.

This finishing core is in a block and aluminum-sheathed room bounded by the four restroom islands. It is the only non-air-conditioned portion of the plant.

What about material handling in this complex situation? Except for stock handling at the beginning of the operation (by one or two lift trucks and small cranes), every machining and finishing step is handled by an elaborate system of tote boxes and conveyors. The conveyors operate in closed loops—either roller or belt. Steel tote boxes are identical in size except for two different heights.

Each tote box can have its destination set by a pin projecting up from one end. By setting the pin, each tote box is automatically shunted off to its proper destination. Several receiving-dispatch stations are spotted around the conveyor loops. The only time a tote box has to be manually carried is along the short distance from a station to a nearby press, screw machine, or



WEIGHING and dispatching hundreds of finished parts to stockroom is simplified by conveyorized tote boxes and elevated conveyor. Boxes bring parts to station from stamping, fabricating, machining. Elevated line takes them to stockroom.

PAINTING, cleaning, and bonderizing operations are carried out in this central core located in the middle of the building. Though it's the only part of the plant that's not summer air-conditioned, the painting core is exceptionally well ventilated.

plating tank. When a boxload of components has been finally fabricated, its "pindicator" flag sends it along to the finished parts stockroom. (Empty boxes, with no pin in place, are automatically washed.)

Again, along the second half of the plant perimeter, where subassembly and final assembly take place, no hand carrying of parts is involved, even though most components are tiny. The conveyor system here is overhead, of seven different roller-coaster units. In the early stages of subassembly, these conveyors carry trays. Final units carry wire frames that accommodate two typewriter chassis.

The overhead conveyors act like giant lazy susans. They constantly circulate with small loads of subassembly parts. Operators select their parts from a passing tray by glancing at the color and number on its tag. Some trays hold enough parts for a week's work. They're refilled whenever necessary as they slowly and periodically return through the finished parts stockroom.

This arrangement also holds for the final conveyors (carrying typewriters in semi-finished stages). Each operator removes the passing unit that needs her attention, adds the appropriate part, and either replaces the unit or slides it along the metal-topped assembly table to the next operator.

The control lab is located beside the finishing core, for maximum convenience. And with its partitions of wire, there's no need for separate air-conditioning zoning. In addition, by its proximity and openness, both lab crew and production people are constantly aware of its importance.

The lubrication storage room is a self-contained fireproof area in part of the central finishing core. Its depressed floor meets fire-protection requirements. Since lubrication is by color code, brand-name containers never reach the production floor. Stock is pumped by manual rotary or air-operated pump from the original container to the lubrication cart that dispenses the lubricants along preplanned routes.

LUBRICATING equipment for the plant maintenance department is serviced in this exceptionally clean oil-storage room. Painted floor is depressed below the main plant floor to meet fire-protection requirements.

CONTROLLING quality is convenient at Royal's new plant. Wire-partitioned laboratory above is located just a step away from vital manufacturing operations.

TOP PLANTS OF 1960

SCREW AND BOLT CORPORATION OF AMERICA
Mount Pleasant, Pa.

DESIGNER-BUILDER: The Austin Company, Cleveland

Full-color painting: page 83. Details on construction and facilities: page 133.

Challenger of Its Industry's Folklore

Folklore of the low-profit margin industries traditionally dictates that their products must be made in unattractive, unimaginative plants. And economy goes hand in hand with drabness, the folklore implies.

But one company, Screw and Bolt Corporation of America, scoffed at the folklore, built itself a glamorous new plant—without spending itself into bankruptcy. Now, instead of three crowded old multi-story buildings in the center of Pittsburgh, the company lives in a bright aluminum and steel structure 25 miles southeast in rural Mount Pleasant.

Far from being an expensive luxury, the new plant enabled Screw and Bolt to cut the costs of manufacturing, material handling, personnel. And because its industry is scarcely in the race to create glamorous plants to attract ivory-tower specialists, Screw and Bolt's achievement is all the more striking.

Here is a completely integrated operation. Raw material from the steel mills—generally coil and bar stock—is cleaned, treated, and sized to produce refined materials from which the finished products are made: screws, bolts, nuts, rivets, and specialties.

The Mount Pleasant operation is virtually complete administration-wise, too. It houses the executive, general, research, and engineering offices in addition to the manufacturing facilities. Everything is centered here at the plant except for outside sales, which retains its original base in nearby downtown Pittsburgh.

For details, let's start with the office. It's a two-story structure, L-shaped. It connects with the plant, and thereby gains expandability. About 25% extra space is built in, and 25% more can be obtained by moving out the common plant wall. (Manufacturing expansion philosophy is much the same—25% expandability is built in. Beyond that, growth will take place at the rear.)

Interior colors are gay. There are light-fawn walls and partitions, with coral doors for accent. Vinyl floor tile throughout matches the fawn and coral.

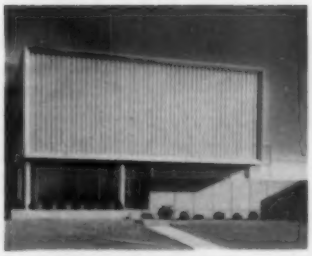
Sidewalls of the office are tilt-up slabs up to the first-floor sills, with insulated aluminum siding above aluminum sash.

Handsome terra-cotta masonry slabs highlight the entrance to the office, and the designer skillfully brought the slabs right into the visitors' lobby to form two walls opposite the bold window-wall corner. And the front face of the plant's high bay is sheathed with this same reddish-brown terra cotta. From the main road in front of the plant, this simple and impressive façade of the left side nicely balances the more complicated design of the right side.

The main building is built within parallel rail spurs which pass along both sides of the plant from the rear of the property. One spur (it's actually two lines inside the building) serves receiving; the other is for

SQUEEZING out nuts, bolts, and rivets from steel rounds or bar stock takes massive machinery, such as this equipment in the nut department. Close by is the material-feeding high bay.

SOARING entrance to the general offices (right) shows handsome ribbed aluminum siding that bands the exterior.



SLEEK, clean lines highlight the L-shaped, 2-story section (left), housing offices and cafeteria.

SPACIOUS lobby (right) has corner window walls that afford a refreshing view of the lawns.

shipping. These opposite tracks remain parallel for a considerable distance behind the building before joining; the open area between is reserved for expansion.

The main parking lot is at the right of the plant and several feet below floor grade. This natural feature permitted the plant designers to build a tunnel from the edge of the parking lot into the approximate center of the building. Wet-weather walking is cut 'way down. This tunnel is 20 feet wide as far as the manufacturing access stairway; then a 12-ft.-wide extension angles off to the office stairway. And here's a supplemental gain: Since a certain amount of excavation expense was involved, it was comparatively easy to build a 50x50-ft. records vault under the rear of the office wing just beyond the end of the pedestrian tunnel.

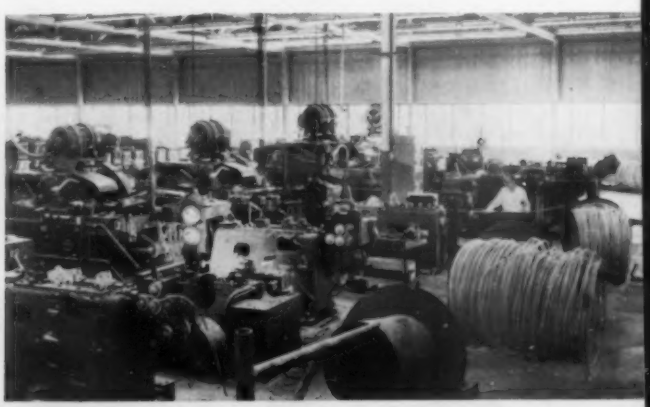
Comfort heating for the plant is furnished by fully automatic gas-fired unit heaters placed in trusses. For the office and cafeteria wing, heat comes from a 100-hp. package-type boiler installed on an equipment mezzanine at the rear of the wing. There's a split system of heating: super-heated hot water for perimeter units, and air for the ductwork. Also on the same mezzanine is the refrigeration equipment for the office and cafeteria air-conditioning system.

For process needs, an 80-hp. package boiler is in a lean-to on the north wall of the plant. It, too, is gas-fired and fully automatic. It supplies steam for bar pickling tanks.

Compressed air is furnished from a regular and a standby compressor housed in a second lean-to on the same north wall. These units are near the center of the wall and tie into the middle of a distribution loop.

Water conservation plays a big part here. Although water isn't exactly short, it's carefully used. Cooling

HEATING the bars for making large-sized nuts takes place in these induction furnaces. As a space saver, substation and motor generator sets are all located on the mezzanine above.



FORMING takes place here, when bolts start out as coils of round stock, then are cold-headed, cut off, and threaded. Controls for underfloor scrap conveyor are on the column (center).

RECEIVING takes place in this building extension at rear of the plant. It accommodates two cars on parallel spurs for unloading in all weathers.

SHIPPING department, at opposite end of the plant from receiving, is spacious and well lighted. Here, shelving is not yet installed.

EATING is pleasant in this corner cafeteria in rear office wing. Full glass walls on two sides let in plenty of sunlight. The cafeteria, at the front side of the plant, is convenient to all—handy to office people, too. An all-stainless kitchen, staffed by a caterer, serves hot meals for those not bringing lunches. And there's access to outdoors for fair-weather dining.

water flows by gravity to a large concrete sump near the rear of the property. There it's automatically skimmed of any floating oil, and sludge drops out. The cleaned water is pumped into a steel ground storage tank, and goes on demand to a small cooling tower before being pumped back to the plant.

Freight car handling has been nicely worked out at Screw and Bolt, as you can see from the top photo on the facing page. It was taken from the end of a 100-ft. extension along the present rear face of the plant. For cold weather unloading, roll doors in front of the two gondola cars are closed. The unloading crane can either deposit the raw stock anywhere along the entire rear bay or transfer it to the high bay crane that runs parallel to the tracks, and to the front of the plant.

After gondolas are unloaded, a Whiting Trackmobile shunts them into the yard beside the plant, and brings in fresh cars. One gondola stays outdoors to receive scrap from an underfloor collection conveyor.

The main plant electrical supply is 25.7-kv., with an alternate 25.7-kv. line coming in from the back. Two main 5000-kva. transformers handle the load with space for a third in the future. Power is distributed at 13,000 volts on a selective loop, with sectionalizing switches for isolation of any of the eight substations. The latter are all mounted on platforms.

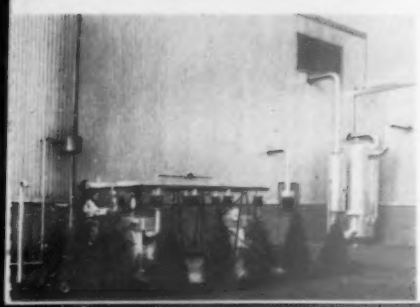
The most out-of-the-ordinary electrical load is the induction heating equipment for preheating of product rods and bars. There are 18 m-g sets above the induction heaters on a mezzanine (photo below). For minimum maintenance, this mezzanine is totally enclosed in sheathing or glass and is pressurized by outside air to keep out plant dust. As a further space-saver, the steel stairway leading up here is pivoted and counterweighted, so it lifts up out of the way (photo, page 115).

HEATING gets rigorous monitoring at this bank of controls for 18 induction-heating motor-generator sets for the hot nut-former line. Housed just above the units it controls, this section is pressurized with outside air to keep out dust.

SILVER WATERSPHERE dominates Springday scene, offers aesthetic contrast to strong horizontal line of plant. Façade of plant complex (below) shows the reserved, "economy-first" architectural treatment.

Expandable Masterpiece of Layout

WATER for all plant services is pumped from deep well at base of watersphere. Well and other key services are at front of plant.



NATURAL GAS service equipment rests behind shrubs alongside boilerhouse wing off south façade of plant. Bright aluminum siding covers all but brick office wing.

Spawned during a recession, Springday Company's new plant is a model of sharp-penciled construction efficiency and engineering design. Its purpose was to get going fast—which it did—and to turn out better V-belts faster and cheaper—which it is doing.

Let's look at some of the specifics to see how Dayco Corporation (formerly Dayton Rubber Company) achieved its goal for its new Springfield facility.

With a budget established in the depths of the 1958 recession, the plant was intended to be the first step toward a much larger operation. To get maximum return on a limited capital investment, first priorities were given to severely functional manufacturing facilities, and to necessary support services, such as maintenance, control lab, personnel, etc. The present office building, for example, covers a minimum area and is inexpensively constructed. As needs increase, additions will be built forward and an upper story added.

Here's how expandability was planned and built in: Sixty-two acres of ground hold the original 209,000-sq.-ft. building. Expansion of all departments will proceed in two directions: north, along a receiving department railroad spur, and east. North and east walls are tilt-up; already several bays of tilt-up slabs have been pushed out to take care of two expansions. The west third of the plant, two stories high, is designed for a third floor. Similarly, the office roof can take an-

TOP PLANTS OF 1960

THE SPRINGDAY COMPANY
Springfield, Mo.

(A division of Dayco Corporation)

ARCHITECT-ENGINEER: The H. K. Ferguson Company, Inc., Cleveland

ENGINEER: Central Engineering Department, Dayco Corporation, Dayton, Ohio

PRIME CONTRACTOR: McLean Construction Company, Springfield, Mo.

Full-color painting: page 84. Details on construction and facilities: page 133.

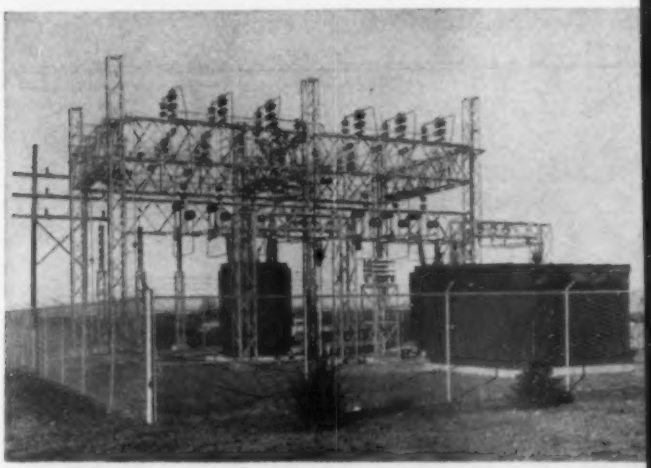
and Handling

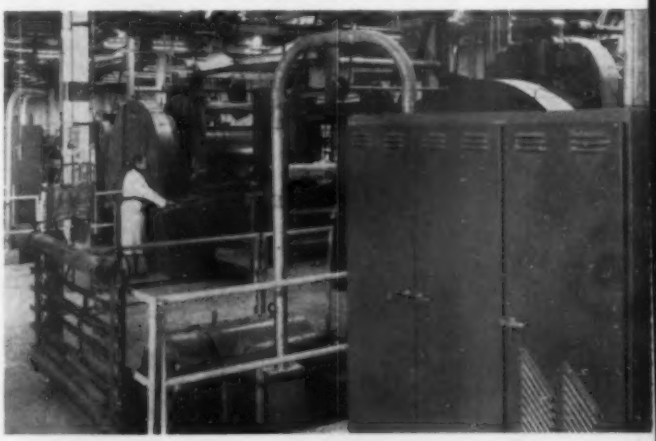
other floor. Main manufacturing and warehouse area (140,000 square feet) has no interior partitions, providing maximum relocation possibilities. Electrically, expansion can easily go to 200 or 250% of the initial load. Water—well supply and fire system—is sufficient for over twice the initial needs.

Relocation of the V-belt manufacturing line from Dayton to Springfield permitted an entirely new approach to problems of production flow, material handling, and equipment design. Results are evident in better yields, more output, lower costs, and reduced order-shipping time. Moreover, the "pencil-sharpening" of construction costs and machinery development, has substantially increased the savings originally projected to justify the project.

One example: The entire plant was completed at a cost of less than $8.10 per square foot of plant area. This figure includes offices, grounds, plant, plant services, seeding, shrubbery, and paving. It also includes architectural, engineering, and financial costs, as well as the total cost of building and grounds.

Springday's office measures 180 feet wide by 60 feet deep. It's attached to the plant, at about the center of the front (south) wall. It contains plant offices, temporary cafeteria, lockers, toilets. The office is built of concrete block with pink face brick. Access at present





ELECTRICITY for plant machinery and services is provided by substation (above). Substation power is tapped from the Southern Power Administration and City Utilities of Springfield. A typical use is for huge drives like the three-roll calender train (below). Photo shows control panel with operator's console.

is from a sidewalk leading in from a large parking lot on the west side of the plant. Eventually, two wings will project from each end of this office building, and a new entrance drive will lead in from the street in front of the plant. At that time, additional quarters for research, development, general offices, and cafeteria will be constructed including the second floor.

Office design shows one typical decision aimed at economy: Air-conditioning ductwork was installed in the accepted style—above the hung ceiling. But the conditioned air is supplied from package units. Tailor-made central station equipment will be added during the office expansion program.

The cafeteria is another example of getting into business fast, with more to come later as needs firm up. No permanent kitchen equipment is in place. Vending machines (photo below) provide the food service. Machines are neatly arranged behind an attractive façade. This technique unifies the several shapes, sizes, and colors of the machines. And the space above is filled by a handsome back-lighted photomural of stylized V-belt applications.

The vending arrangement also typifies the degree of economy that went into the plant design. But cheapness and skimping were not tolerated. There's generous selection, from milk to hot foods, from 10 machines.

MATERIAL HANDLING (above, and on facing page) plays vital role. Here you see semi-automatic powder compounding.

The manufacturing building initially measured 700 feet wide by 240 feet deep. A second story, 100x240 feet, was constructed over the heavy equipment section of the building at the west end. The roof over this area is concrete to take a planned third floor. When this is built a hydraulic elevator can be extended.

Manufacturing area is open—for layout flexibility and handling efficiency. Service facilities are attached. Combination boiler room and maintenance shop of 4800 square feet, and a separate 1600-sq.-ft. solvent cement house are placed along the east and south walls to avoid interference with manufacturing expansions.

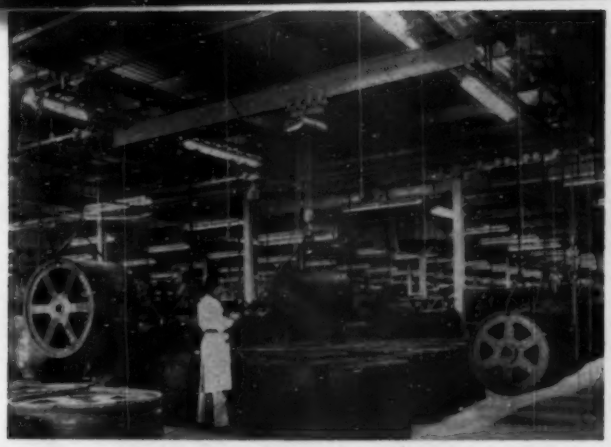
Walls on the permanent south and west sides are of pastel-pink face brick on lightweight block rising to the sash. Tilt-up slabs are used on the expandable north and east walls. Above the sash, on all four sides, siding is insulated aluminum sandwich panel with corrugated surface design.

All departments are laid out in straight-line sequence running from west to east. Expansion will proceed to the north; it will be possible to add departments as production increases and still maintain the desired west-to-east straight-line flow.

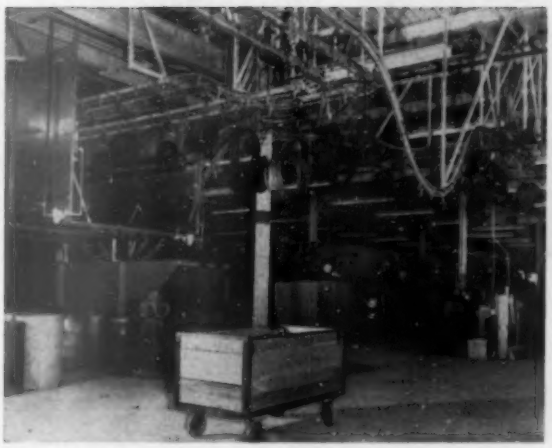
Although many of the material-handling items are special, they indicate how much high-powered engineering went into the Springday plan to help get out better V-belts, faster and cheaper. Photo (top of this column) is an example. It shows a specially designed rig for selecting and weighing dry materials prior to dumping them into a huge Banbury mixer. Operator simply guides his low-slung crane-supported car to a desired chute, weighs out the material, and shoves the filled hopper off to the waiting line of materials for the next Banbury batch.

Carbon-black powder handling is another case of advanced material handling. Long a headache in rubber plants, here the problem has been really minimized. About 90% of the various grades of carbon black are received in airtight stainless steel tote bins. These are placed in a snug-fitting hopper and overturned into an enclosed screw conveyor for transport to automatic batch weighing. All sources of carbon dust are

Temporary, yet attractive eating facilities are provided by neatly arranged vending machines (above). Well-cared-for dining area adjoins bank of machines. Aesthetic value is added by colorful mural atop machine line. Temporary, yet efficient main office (below) allowed Springday to "get into production fast." Eventually it will be used as plant offices.



CRANEWAYS and monorails team up to move big iron drums swiftly and effortlessly to area where they'll be used as mandrels to fashion large V-belts.



MONORAILS carry molded V-belts along overhead system from dryer to area where they're self-classified and dropped into cart.

ROLLER CONVEYORS wind through warehousing, enable two men to load trucks as cartons move from racks to trailer.

shrouded. Dust that does escape is whisked into a collection system that reclaims it within four minutes and sends it along to the parent batch of rubber being compounded in the Banbury.

On the production floor virtually everything is handled by overhead conveyor. Top and left photos above are examples. A variety of light- and medium-weight cranes are used, all floor-operated, plus several styles of monorail and chain conveyors. The few trucks are special-purpose, and don't clog the aisles.

Springday worked closely with manufacturers of two types of material-handling conveyors, came up with a warehousing solution (right photo) that cut personnel requirements to the bone. Fewer than 15 men are now needed, compared to more than 50 used in a previous warehousing operation. At the heart of the system is a live-storage rack, for first-in-first-out control. Packages are placed on these inclined racks from behind. Order picking is done right onto a powered conveyor that takes packages directly into a truck; two men can handle the complete loading of a load of V-belts from racks to trailer.

Electrically, the Springday plant has been planned for continuity of service, expansion, and flexibility. Incoming power arrives at 69,000 volts from a loop made up of the Southern Power Administration on one side and the City Utilities of Springfield on the other. Both lines are carried into the substation on a single pole line. In case of emergency, one line can be opened and the other closed by manual line switches. There's available space in the substation yard for 200% more outdoor metalclad switchgear equipment.

In the manufacturing building there is extra duct capacity, and space in cable trays within the building for future cables.

There are two load center substations inside the plant, on opposite sides of the building. One is near the boiler-house wing, and the other is directly opposite, to care for other heavy loads. Additional load centers will be put in as the need develops.

The boiler room can be expanded in increments of 20x40-ft. bays when additional boiler and auxiliary equipment is needed. At present, a 30,000-lb.-per-hour steam boiler suffices. It's a relocated unit, upgraded and cleaned to look and perform like new.

Heating and ventilating in the main building are handled by combination units, ceiling-mounted. The building is kept under positive pressure, except for the compounding section. This area is maintained under negative pressure so dust will not be carried into the main part of the plant. The ceiling mounted units distribute both fresh and recirculated air throughout the plant by means of ducts and grilles.

SERVICE CORES on roof show in this northeast aerial view. Four-story double-tee office is in front.

REVOLVING DOORS in glass vestibule, slanted glass panels in shining mullions under canopy, greet visitors.

TOP PLANTS OF 1960

WESTERN ELECTRIC COMPANY, INC.
Columbus, Ohio

ENGINEERS: Plant Design and Construction Division, Western Electric Company, Inc., New York City and Chas. T. Main, Inc., Boston

MANAGEMENT CONTRACTOR: Turner Construction Company, Inc., New York City

Full-color painting: page 84. Details on construction and facilities: page 133.

Progressive Giant of Conservative Design

The designers and builders of Western Electric's new Columbus (Ohio) plant faced a three-way challenge. Here's what their building had to provide:

1. An efficient, comfortable work place for over 5000 people.
2. Complete development, testing, and manufacturing facilities for a highly complex piece of telephone switching equipment.
3. Ready adaptability to the rapidly changing demands of a mushrooming telephone technology.

The result: the sprawling, yet clean-lined plant shown in the aerial photo above. Sitting on 250 gently rolling acres, not far from the Columbus airport, the handsome facility presents a low, modern silhouette. The exterior combines light-colored face brick with mingling shades of tan (not just monotonous yellow) and striking rows of continuous sash.

Inside the manufacturing areas, impressive flexibility is the plant's big attention-getter. And flexibility is quite a challenge because the plant is huge—well over a million square feet.

Here's how Western Electric arranged its acres of adaptability: The relatively fixed operations were placed along the plant periphery. Within this periphery, almost all manufacturing operations of component fabrication and subassembly can easily be enlarged, relocated, or eliminated by moving work tables and wire partitions. Just as easily changed are the multiple loops in floor, table, overhead conveyors.

All service utilities encircle the plant in generously

sized loops, with several cross-links between loops in high-density interior areas. Steam, cooling water, electricity, gas, and so on, are but a few feet away from any altered machine location.

The demand for flexibility—unusually great even for the electronics industry—stems from the specialized product of the Columbus plant. This product is an intricate, compact "crossbar switch" that is the heart of the communication marvel of direct distance dialing (or DDD as it is known in the Bell System). Each of these crossbar switches is several-hundred pounds of complex steel and wire parts mounted on a steel frame about 4 feet wide and 7 feet high. Since development of such an item is never static, Western Electric must be ready not only for improved methods of fabricating today's product, but also for the vastly different switching products of tomorrow that are on the drawing boards right now.

The key feature of the manufacturing building—flexibility—is very much in evidence in the office, too. Most of the floor area is open, with departments delineated by low or medium-height steel and glass partitions. As changes occur, it will be easy to expand or modify department areas. Principal exceptions to the open characteristic are two central cores of stairwells, elevators, lockers and toilets, utility risers, and air-handling ductwork.

The outside-air intakes for these two service cores, placed atop the third-floor roof in twin penthouses, led to a revision of earlier plans. The space between was filled in, giving a cleaner roof line. And the change created valuable fourth-floor space for a set-back office area that gives employees a fine panorama of the open countryside.

Natural topography made it possible to place the ground floor of the office one full story below the plant floor. Result: Plant traffic comes directly into the plant-oriented second floor of the office. A large medical section, for instance, occupies part of one of the twin wings that connect plant to office.

Other floors house groups less directly concerned with plant operation. Since Columbus is the headquarters plant for crossbar switching equipment (with other plants making components), the upper echelons of staff activity are centered here. Also in this area is a 300-man unit of the Bell Laboratories. This unit is charged with the design, development, and testing of present crossbar equipment, and with the design of electronic switching systems that the Columbus plant will manufacture in the future.

Both these groups help to account for the surprisingly large, 250,000-sq.-ft. office building that serves over a thousand people.

A spacious enclosed court lies between the twin rear wings of the office double-tee. This court helps give light and beauty to surrounding office and plant areas in all seasons. In good weather it serves as a pleasant noon-hour gathering spot.

Clearly visible from the highway are twin cafeterias that add remarkably to the appearance of the huge plant building. Each occupies both sides of a front corner, with panoramic glass windows permitting colorful views of the countryside in two directions. To cut

UP AT THE CEILING, workers on a 50-ft. boom truck easily service lights, piping, heaters. This photo shows the high bay at the rear of the plant.

DOWN ON THE FLOOR, smooth tiles in most manufacturing areas simplify housekeeping, make it easy for motorized sweepers to keep plant clean. Note overhead monorail unit.

ACROSS THE AISLE go parts between parallel benches. Several kinds of conveyors help speed the complicated production of crossbar switches. Lighting level here is exceptionally high.

CONVEYOR CONTROL is centered in several of these many-eyed consoles. This one routes tote boxes of small items.

HEALTH CONTROL stems from excellent medical facilities typified by this x-ray equipment. The staff includes two doctors.

LIGHT CONTROL in this cafeteria—one of three—is achieved with these modern windows that slant to reduce the glare.

Manufacturing has its own "factory within a factory" away from assembly areas.

the glare and to add a touch of modern design, the cafeteria windows slant outward at the top, under a flat canopy that gives a striking "eyelash" effect from the outside.

Easily accessible, each cafeteria can be quickly reached by office people through the nearest stem of the double-tee. These two cafeterias each handle about one-third of the plant people. A third cafeteria serves employees near the rear center.

Western Electric's high bay at the rear of the plant is virtually a factory in itself. It is devoted to receiving, heavy fabrication, stocking, and shipping. Significantly, it represents one of the greatest contributions that this plant makes to the future of Western Electric —that of being an integral manufacturing unit. Operations were consolidated here in Columbus from several different locations, and a far larger proportion of components are fabricated than are purchased. This has resulted in efficient and almost autonomous operations, with quality control built in.

Located at the northeast corner of the plant are a separate boiler room, a maintenance building, and a garage. These buildings contain about 74,000 square feet. Nearly 200 men are quartered in these and other buildings, such as the fuel-materials area of about 10,000 more square feet.

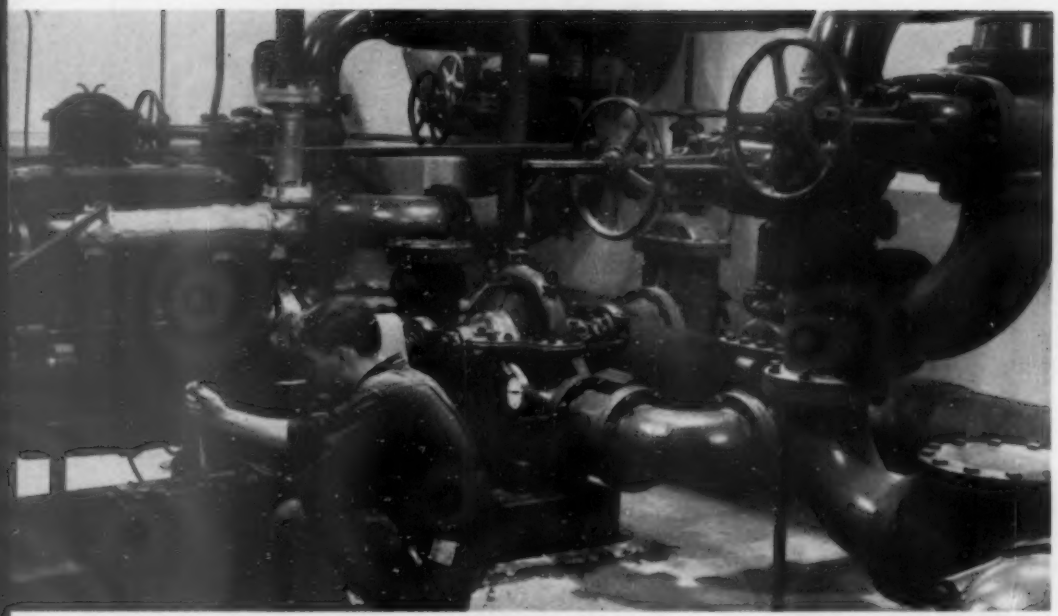
The utility substation is located diagonally across the highway from the main office. The two feeders for the whole plant were brought underground to a large vault in the southwest corner of the office (center photo at right.) No overhead wires are visible, either into the plant or around it. From the vault, 14 feeders head into the office, plant, and auxiliary buildings. They're easily accessible, yet out of sight.

Ease of maintenance of the electrical equipment is also illustrated by the same photo. A roll-out-type main circuit breaker facilitates cleaning and parts replacement. The unit shown includes the 14 feeders, two main circuit breakers, and one tie breaker.

The aerial photo on page 122 shows how Western Electric designed electrical flexibility into its manufacturing building. Of the eight rows of penthouses with five houses per row (four miscellaneous houses make up the total of 44), half are electrical structures. They're fed from the vault on the ground floor of the office, and in turn provide flexible service to any part of the plant.

Access to these penthouses is convenient. They can be reached either by the high-lift maintenance boom truck (top photo, page 123) or by elevator to the roof that is a part of one of the rear central penthouses.

The other half of these roof penthouses are designed for air handling. Each penthouse has a filter bank, steam coils, and fans, with space for cooling coils if they're required in the future.



OUTAGE CONTROL is assured by this emergency diesel generator serving fire pumps, key boiler equipment, and auxiliary lighting units.

COST CONTROL for services is aided by these roll-out circuit breakers in the electrical vault on the ground floor of the main office.

FIRE CONTROL nerve center watches 80 fire-alarm boxes, can be in instant touch with municipal fire department. This 24-hour office, with a fire truck, adjoins the boiler house.

TIME CONTROL is a result of these tiled locker and toilet cores close to work areas and near entrances to huge twin parking lots. There are similar units on all office floors.

B.F.Goodrich All-Purpose tires keep crane in action in Keystone Steel mill yard. Downtime is reduced to a minimum in spite of rugged work conditions. Loads range up to 10 tons.

Red Brand woven wire fence is stockpiled at warehouse. Specially designed "battlewagon" operates on B.F.Goodrich Solid tires that easily withstand abrasive wire scraps.

3000 lbs. of fire brick are unloaded at Keystone open hearth pit. Lift truck rolls on B.F.Goodrich All-Purpose industrial tires that defy the impact of railroad tracks.

Cold drawn steel wire coils are delivered to nail mill operator. Tires are B.F.Goodrich Solids that work 24 hours a day, 7 days a week. No tire maintenance is required.

B.F.Goodrich industrial tires cut downtime, save money all around steel and wire company

Delivering cold drawn steel wire coils to the nail mill—hauling fire brick to giant ladles in the open hearth pit—towing wire cars into a storage warehouse—unloading fence posts in the inventory yard—loading freight cars with Red Brand fence—all around Keystone Steel and Wire Co. materials are moved faster and easier on B.F.Goodrich industrial tires.

Downtime and tire costs are cut to a minimum, because each piece of equipment rolls on the B.F.Goodrich tires specifically designed for the job. The B.F.Goodrich Tire and Wheel Analysis Man studied the company's setup—floors, loads, equipment, etc. Then he advised which B.F.Goodrich industrial tires would give longest service at lowest cost—advice that was unbiased because B.F.Goodrich makes a complete line of industrial tires and can recommend the right tire for any job. As a result of this TW Analysis, Keystone Steel chose B.F.Goodrich tires for *all* its vehicles.

This case history is typical of the savings B.F.Goodrich Tire and Wheel Analysis Men are offering industrial tire users all over the country. Why not take advantage of this *free* B.F.Goodrich service. Mail the coupon below today.

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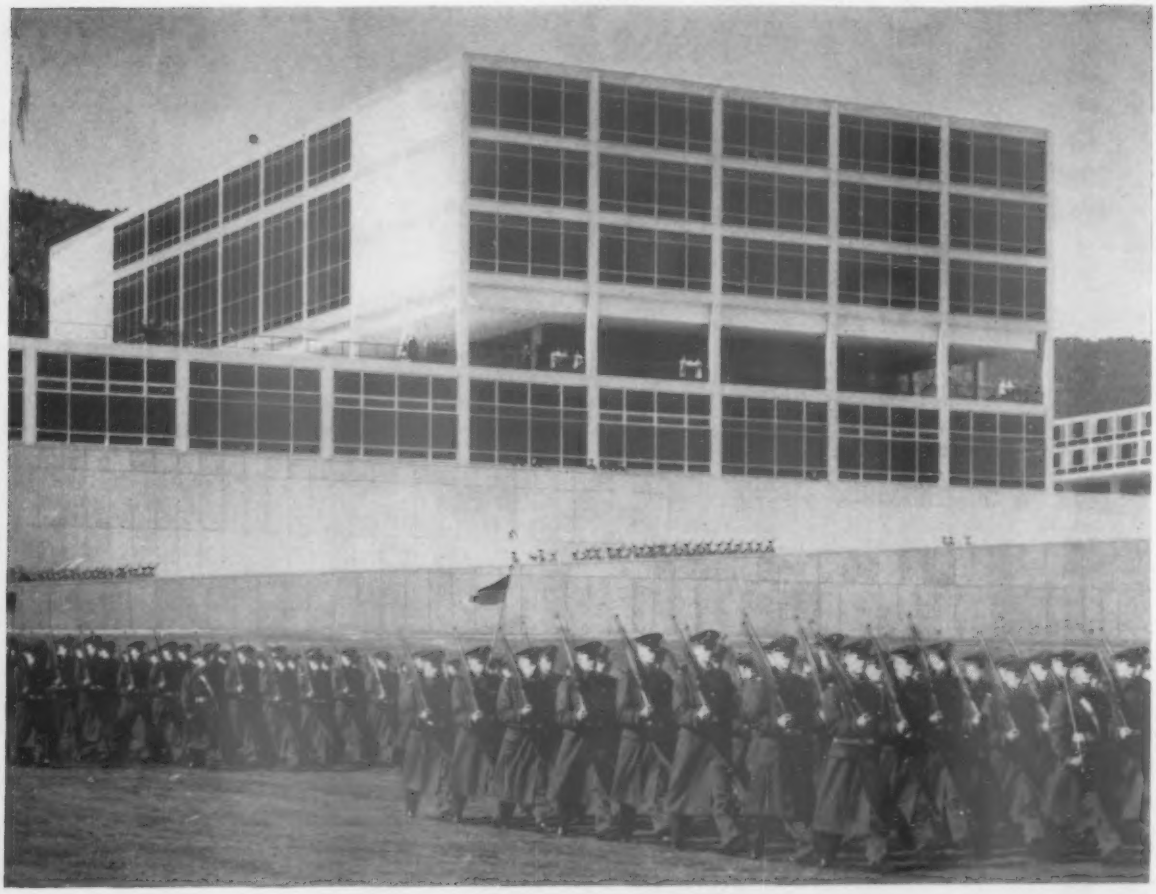

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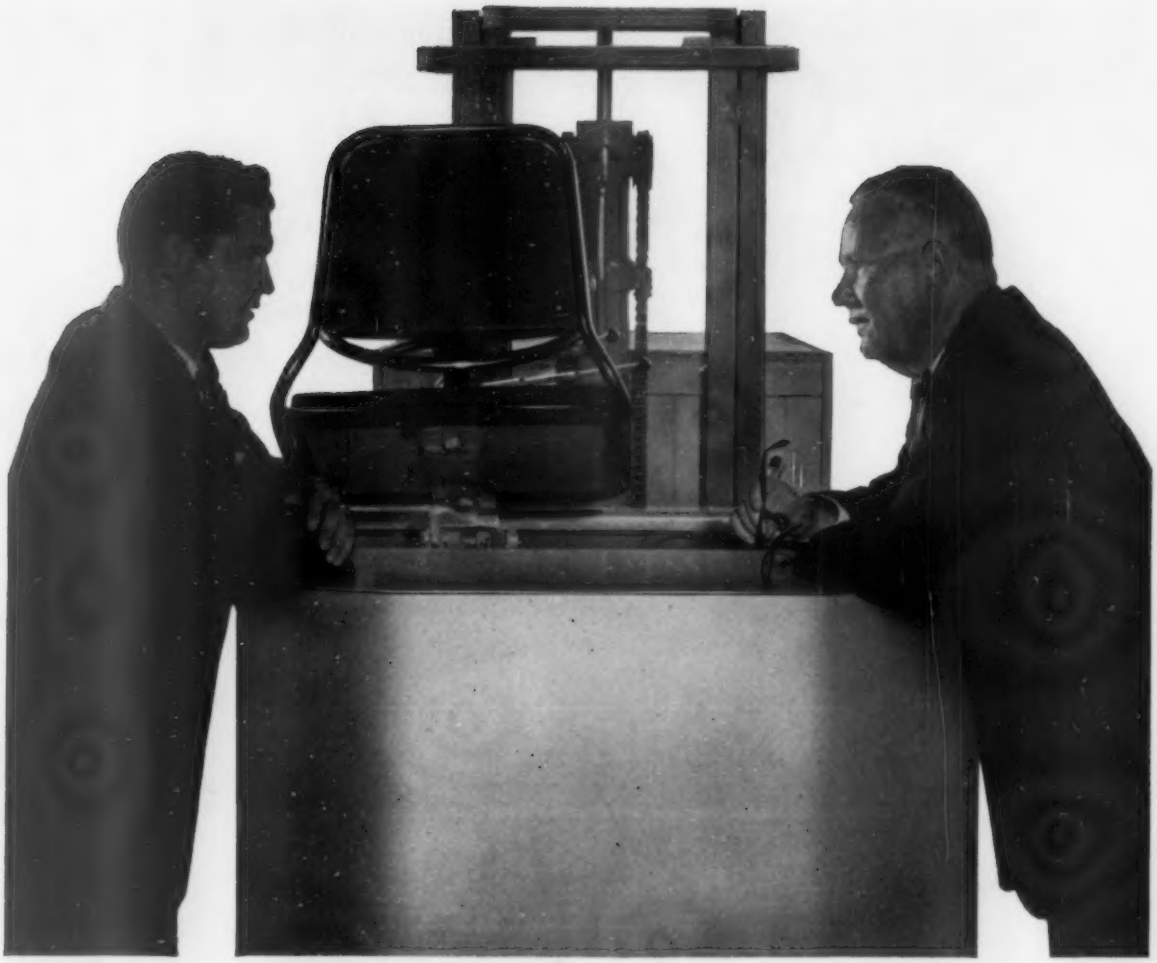

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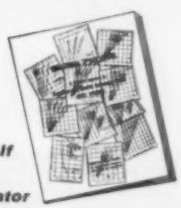

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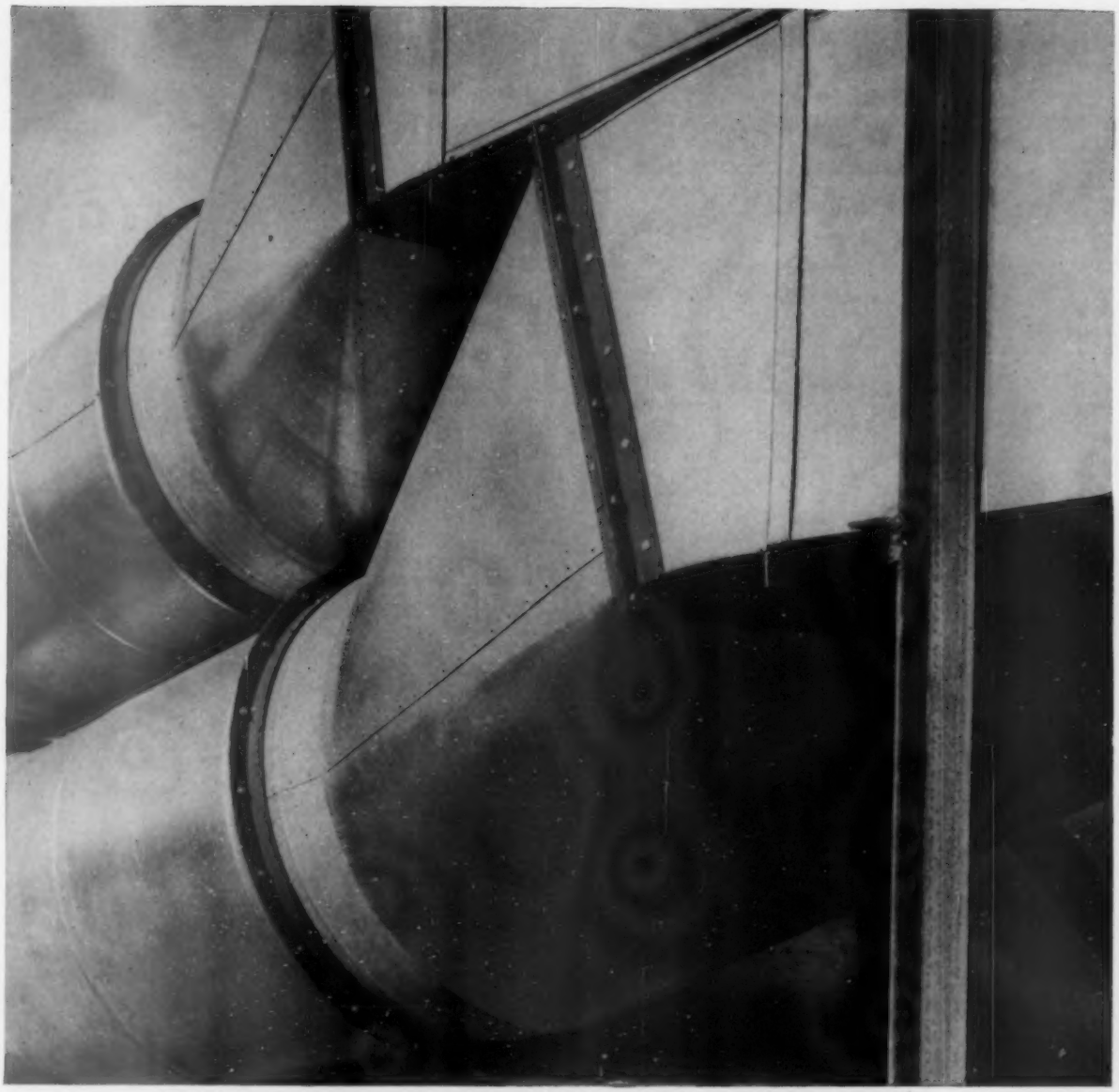

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Specifications Showcase

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Turn the page

TOP PLANTS OF 1960 — SPECIFICATIONS SHOWCASE

BUILDINGS AND GROUNDS

OFFICE STATISTICS

	THE BRUNSWICK-BALKE-COLLENDER CO. Automatic Pinsetter Division Muskegon, Michigan	CHRYSLER CORPORATION St. Louis Assembly Plant Fenton, Missouri	FLICK-REEDY CORPORATION Bensenville, Illinois	G-V CONTROLS INC. Livingston, New Jersey	IDEAL CEMENT COMPANY Tijeras, New Mexico	KENNECOTT REFINING CORPORATION Anne Arundel County Maryland	ROYAL McBEE CORPORATION Springfield, Missouri	SCREW AND BOLT CORP. OF AMERICA Mount Pleasant, Pennsylvania	THE SPRINGDAY COMPANY A division of Dayco Corporation Springfield, Missouri	WESTERN ELECTRIC COMPANY, INC. Columbus, Ohio
Product	Automatic pinsetters for bowling alleys.	Valiant, Plymouth, & Dodge Dart automobiles.	Air-hydraulic cylinders, Tru-Seals, filters.	Electronic relays & thermostats.	Portland & masonry cements.	Refined copper wire bars & billets.	Portable typewriters.	Bolts, nuts, screws, and rivets.	V-belts.	Telephone system switching apparatus.
No. employees	600	4400	300	300	100	570	1500	800	400	5200
Plant (acres)	16	235	94	14	35, excl. quarry.	107	85	75	62	250
Setting	Urban.	Rural.	Rural.	Suburban - Indust.	Mountainous - Rural	Rural.	Suburban.	Rural.	Rural.	Suburban-Rural.
Shape	Rectang. (joins front edge of plant).	Short & broad "U"	2 connected Butler buildings.	Rectangular, with open court.	Ell.	Ell.	Tee.	Ell: 50' x 200'; 80' x 100'	Rectangular.	Double Tee.
Stories	2	2	1	1	1	2	1	2	1	4
Floor area (sq. ft.)	47,000	62,000	62,000	10,000	16,000	27,500	35,000	28,000	10,800	250,000
Expandability	2nd fl. unfinished.	100% plus, to west.	100%	50%	Space built-in.	100% plus.	100% plus.	25% built in; 25% more beyond wall.	6-fold, by wings.	Not expandable.
Floor construction	Slab on earth, slab on steel form.	1st: Concrete slab; 2nd: Pre-cast conc.	5" reinf. slab.	6" slab.	Sonovoid slab over basement.	Poured concrete.	Pan-type concrete over crawl space.	Reinforced conc. slabs.	Concrete on compacted earth.	Concrete
Under-floor duct	Both floors: phone and power duct.	Both floors: steel duct on 5" centers,	16' centers; 2" module	Duct ducting.	Electrical and phone conduits	In each floor.	Electrical & phone.	Power and phone duct on 2' centers.	Phone and electric ducts to all desks.	Telephone & power ducts on 6' ctrs. Duct access ev. 2'
Floor covering	Asphalt tile, terrazzo, ceramic tile.	Terrazzo: stairs, entrances; balance of asphalt tile.	Vinyl, rubber	Asphalt tile, some vinyl.	Vinyl, Ceramic & quarry tile in locker areas.	Rubber tile.	Vinyl asbestos.	Vinyl tile.	Asphalt; vinyl in reception.	12" x 12" x 1/8" Vinyl tile.
Tunnel or basement	10' x 10' x 538' Tunnel crosses beneath street to existing plant.	None.	Filter & Pump room.	None.	4000 sq. ft. partial basement, plus perimeter pipe trench.	Complete basemen for services.	4' crawl & pipe space.	50' x 50' records vault. Tunnel from parking lot.	None.	None, but ground floor is cut into a hill.
Elevator	None.	Freight, for 1st, 2nd, & penthouse.	None.	None.	None.	Dumb-waiter.	None.	None.	None.	3 possenger, 1 5-ton freight.
Sidewall construction	Front: curtain wall. Ends: face brick, block. Rear: fire wall.	Face brick, stone, porcelain enamel sandwich panel.	Block, with catalytic glazed coats.	Concrete block, airspace, tan colored face brick. Low sill.	Lightweight concrete precast panels 6" thick.	Poured concrete below ground. Concrete block above ground.	Aluminum frame curtain wall.	Tilt-up slabs, insulated alum. siding above windows.	8" block, brick facing.	Concrete frame, masonry walls.
Fenestration	Curtain wall of porcelain enamel, glass, aluminum mullions.	Fixed aluminum, in continuous vertical aluminum mullions.	Front: 440' display wall, facing highway. Rear: window wall, joins mfg.	Clear glass to roof, in aluminum frames.	Many picture windows, alum. mullions.	Steel casement, except for full glass in lobby.	3/16" & 1/4" gray glass.	Aluminum sash, 5' modules; every 2nd sash with ventilators.	Continuous aluminum, projected type.	1st 3 flrs: continuous fixed alum. 4th fl.: 1/4" plate glass.
Bay sizes	20' x 30'; 20' x 24'	24' x 24'	70' x 20'	Cols. on 22' ctrs.	18' x 24'	Does not apply.	24' x 24'	20' x 20'; 20' x 30'.	20' x 20'	24' x 24'
Clearance	9'6"	1st: 13'; 2nd: 10'	9' below plenum.	9' 4"	Beneath barrel roof.	8' 6"	10' 4"	12'	9' 6-1/2"	9'3"
Roof construction	Steel deck on steel framing.	Pre-cast roof deck on concrete girders and columns.	Butler peaked roofs. Ribbed alum. sheets on purlins.	Same as plant.	Barrel-shaped roof of pre-cast curved slabs 3" thick.	Poured gypsum slab, steel reinforced, on lightweight trusses.	Steel girders, joists; metal deck.	3" Tectum deck, on steel framing.	Concrete on steel framing to take 2nd fl. (150 psf.)	3rd fl.: concrete. 4th fl.: poured gypsum over steel framing.
Roof insulation	Mineral board.	2" rigid cork slab.	1-1/2" fiber glass.	Same as plant.	2" rigid insulation on exterior, plus marble chips.	Fiber glass.	1-1/2" Fiber glass, ponded.	Tectum		Poured gypsum over fiber glass foam boards. Marble chips.
Equip. on roof	None.	Air cond. equip. penthouse, 26' x 110' x 13' high.	None.	None.	None.	None.	Air intakes, service penthouse.	None.	None.	Small 4th fl. between 2 service penthouses.

PLANT STATISTICS										
Shape	302' x 302' Rectangular plus 20' x 180' RR track enclosure.	Rectangular, with extensions.	7 connected Butler buildings.	Rectangular, with service wing in rear.	5 main bldgs. & several auxiliaries of assorted shapes & sizes.	Several rectangular buildings.	Rectangular.	2 connecting rectangles.	Rectangular at first; extensions now added at rear.	Rectangular.
Stories	1	1, plus mezz.	1	1	Vary: 1 to 4	1- & 2-stories.	1	1	1- & 2-story comb.	1
Floor area (sq. ft.)	178,300	1,452,000	158,000	36,000	98,000	475,000	263,000	530,000	198,000	1,250,000
Expandability	South; 150,000-sq. ft.	25%, to west.	300%	50%, then to 100,000 sq. ft.	Being doubled now.	In 2 directions.	100% plus.	25% built in; 100% more available.	100% plus. (wings, 2nd & 3rd floors.)	Future mezzanines in high bay.
Floor construction	6" & 8" reinforced concrete.	Concrete.	6" reinf. slab.	5" slab.	Reinf. conc.; steel grating; conc. tees.	Concrete.	Hardened 6" conc.; granite chip aisles.	6" & 8" reinforced concrete.	Concrete slab.	Concrete slab.
Floor capacity, psf.	3000	1st: 500. Mezz.: 175.	10,000 lb. wheel load.	200	100, 200, 400, & 600.	Up to 4500	500	1500	1st: 500, 2nd: 250	
Floor covering	Trowelled-in metallic surface hardener.	None, except terrazzo in locker areas.	Iron filings, chlor-rubber sealer.	Hardened concrete.	Vinyl tile (control room); hardened concrete.	Tile in plant offices.	Vinyl asbestos; locker rooms: terrazzo.	2 1/2" recessed wood block in tool, machine, & packaging areas.	None	12" x 12" x 3/16" vinyl-asb. grease-proof tile. Some wood block, conc.
Foundations	42" thick slab for air compressor.	Some drilled caissons, some H-column pilings.	Columns on caissons. Special machinery slabs.	Grade beams; piers on footings.	Massive concrete, for vibration control.	Many specials: under furnaces & tanks.	30" caissons, grade beams.	Poured, bell-footed. On clay or rock.	Reinf. conc. for heavy equip., inc. some pits.	Spread footings.
Tunnel or basement	See "tunnel" entry under office section.	Basement in B.H. Pits & trenches for assembly.	None	None (except for depressed boiler room floor.	Wiring access: tunnels uner 2 substation rooms.	270,000-sq. ft. full basement in tank house.	4' crawl space under service cores.	Pedestrian tunnel from parking lot to mid-plant & office.	None.	Tunnel from boiler house to mfg.
Elevator	None.	1 freight, plus car body conveyors to mezz. painting.	None.	None.	3 at 750 lb. (pers'n'l.) 1 at 5T, 1 a 6T (freight).	To boiler room in anode casting bldg.	None.	None.	7-ton hydraulic elevator; designed for eventual 3rd fl.	3 freight: 4, 6, 16-ton.
Sidewall construction	Light tan face brick & block, up to limestone sills. Above sash: insulated aluminum siding.	13 1/2' high tilt-up panels, 4'2" high windows, 8'8" alum. siding.	4" block & 4" brick. Brick pilasters.	Same as office, except for 6'8" high sill.	4" & 6" pre-cast lightweight conc. panels, bolted to conc. bldg. frames	Precast concrete panels 5' x 20'	Face brick on block below windows; field fabricated insulated wall above.	Tilt-up slabs, aluminum siding above windows.	Front & side: face brick on block; insulated alum. Rear & side: tilt-up.	Masonry: glazed tile inside, face brick outside.
Fenestration	Galvanized pivoted sash, continuous; heat-reducing.	Continuous horizontal aluminum windows.	Ext.: None, Picture window wall betw. office & mfg.	4' sash, projected aluminum frames.	None, except for plastic panels in conveyor galleries.	Corrugated plastic band near roof line of all bldgs.	3/16" solar gray, in aluminum sash.	Steel ventilating sash.	Steel, projected type.	Continuous strip perimeter windows.
Bay size	40' x 40'	45' x 45'	50' x 22'; 70' x 22'	22' x 22'	22' x 55'; 22' x 52'.	20' modules, vary up to 120'	40' x 40'	60' x 40'; 60' x 60'.	1st fl.: 20' x 40' 2nd fl.: 20' x 20'	40' x 60'; 60' x 60'.
Clearance	16' to bottom of trusses.	18' to truss line in both main & mezz.	14' 3" below steel.	8'8" under ducts & piping.	6'8" minimum under piping.	For cranes in most all buildings.	16'	18' below trusses. (26' in high bay.)	Rec. & Shpg: 18' Mfg.: 16'	18'; & 30' high at rear.
Roof construction	Steel deck on steel framing.	Steel deck on steel trusses; non-combustible vapor seal.	Same as office.	1" formboard over steel framing.	Thin shell barrels, pre-cast double tee sections with 2 1/2" lightw't conc. slabs.	Precast pre-stressed conc. double-tee panels on steel trusses.	Steel trusses, purlins; acoustic metal deck.	Mostly 2 1/2" Tectum on steel framing. Pickle house: wood deck.	Metal deck on steel, except for 6" concrete roof for future 3rd fl.	Mostly steel frame. Some: conc. plank, Q-deck, corrugated alum.
Roof insulation	1 1/2" mineral board.	Cork.	Same as office.	2" reinf. gypsum concrete.	2" rigid plus chips, on mtce. bldg.	Fiber glass or foam glass.	1" fiber glass, ponded.	Tectum.	1" pre-sealed fiber board.	Poured gypsum on form boards, chips.
Extra truss capacity	2000-lb. per panel point. Crane bay trusses: 5-T. crane.	1000 lbs. per panel point minimum; many heavier trusses.	1- & 3-ton cranes can be added.	None.	Does not apply.	Many crane bays.	2 1000-lb. per each of 3 panel points.	2-ton at center of truss.	8 psf. for lightweight conveyors.	1000-lb. per panel point, plus 6-psf. or 10-psf. for service loads.
Equip. on roof	20' x 40' x 16' elec. penthouse. Air cond. condensers.	4 90' x 135' x 16' penthouses for air hand. Many vent. & exh. stacks.	13 air handlers. Crane penthouse over plating tanks.	22' x 66' x 12 1/2' penthouse for 2 air handling units. Space for 3rd unit.	Dust arrestors, mtce. hoist frames, cooling towers.	Ventilators.	Air intakes; service penthouses; fume exhausts.	Cooling tower, ammonia tank, power & gravity ventilators.	Ventilators.	44 penthouses alternating bet. elec. & air h'ndl'g. Many spec. vents.
PLANT AREAS										
General layout	Primarily assembly plant; fabrication planned in future expan. Parts arrive in truck, travel in perim. loop around bldg. Storage in center.	2000 fork lift loads move out of RR cars per day, & onto 1000 4' x 9' trailers to use point or reserve storage. Plant tooled for 960 cars per day.	7 contiguous Butler bldgs. form 7 open bays. Aisle & window wall attach plant to 2 perpendicular office bays.	Chem. cleaning, spray painting, & brazing are enclosed in ventilated room. Balance of mfg. in virtually open area.	Raw limestone from quarry at rear of plant enters crusher bldg., conveyed to screen bldg., then to storage silos. Fired in rotary kiln. Ground. Stored. Bulk or bag.	U-shaped flow pattern from receiving yard through production bldg. to shipping point.	Generally clockwise flow, with passes in & out of central core of metal treating depts. Flow starts & stops at comb. shipping & rec. depts.	Steel coils & bar stock arrive by rail. High bay trans. raw stock to parallel hot or cold lines. Whse. & shipping at opp. end of plant. Ship: rail & truck.	Straight-line flow: rec., raw mat. storage, compounding & mixing, calendering, cutting, belt bldg., skiving & cutting, molding, insp., whsing., shipping.	Materials rec. by truck & rail at NE corner, travel in general U-pattern (with many side-steps) around to shipping on NW corner.
Partitions	Wire mesh, except for lightweight block for rec. & guard offices, & wash rooms.	None on main floor. Metal partitions for in-plant offices. Masonry for overhead toilet rooms.	None, except 7' wire fences around key departments.	Free-standing concrete block, open wire mesh, movable metal, low railings.	Generally reinf. conc., for pressurization of key areas.	None, except for in-plant offices, locker rooms, etc.	Essentially none, except for 30,000 sq. ft. central core.	No factory partitions.	Open plant except for fire wall between rec.-storage & mfg. Isolation of some depts.	Generally open interior, with full partitions for perimeter shops, offices.
Mezzanines	Unused office 2nd floor: temporary mezzanine.	11 bays x 15 bays (495' x 675') for body paint shop.	None.	None, except temp. storage in penthouse.	Steel grating landings.	In center core of mtce. bldg.	4 equip. rooms above toilet & locker cores.	Elevated washrooms, substations, MG room.	Reinf. concrete mezz. for support of Banbury mixer.	In high bay area at rear.
Noise reduction	Vibration mounts on certain machines.	Acoustic ceiling in 45' x 273' in-plant office.	Exposed roof insulation; rubber mounted machinery.	Enclosed room in Eng. lab. for hi-frequency vibration pump.	Control room: Thermopane, acoustic ceil. Key equip. on vibration pads.	Air compressors located separately.	Acoustic roof (.70 N.R.C.). Vibration mounts throughout.	Tectum roof deck.	Plant office partitions: acoustic panels below glass.	1" thick mylar-faced fiber tile: office & selected mfg. locations.
GROUNDS										
Auxiliary bldgs.	None.	8 aux. bldgs., including 107' x 182' power house, 107' x 242' paint mix bldg., 22' x 58' plant protection	Depressed-floor solvent storage; each abuts plant for easy access.	None.	Pump house, detonator house, powder house (for quarry), well house, fuel oil, & water tanks.	Sewage lift; sewage treatment; paint shop; garage; gas meter house; railroad scale; truck scale	Boiler house connected to plant by passageway. 100,000-gal. standby fuel oil tank. 300,000-gal. water	Sewage disposal plant at rear of property. Existing brick & granite bldg. (purchased with property) used	40' x 40' volatile solvent building, 100' W. of main plant. Constructed & wired for explosion-proof	74,000-sq. ft. of service buildings: Boiler Hse.; mtce; garage; pump hse. Also: water, oil, gas, acid, & waste

perim. roadway. ft. cars. eter heating. Other: gas and not dirt ducts. compounding area. at perim. runs.

GROUNDS	Auxiliary bldgs.	None.	8 aux. bldgs., including 107' x 182' power house, 107' x 242' paint mix bldg., 22' x 58' plant protection bldg.	Depressed-floor solvent storage; each abuts plant for easy access.	None.	Pump house, detonator house, powder house (for quarry), well house, fuel oil, & water tanks.	Sewage lift; sewage treatment; paint shop; garage; gas meter house; railroad scale; truck scale houses.	Boiler house connected to plant by passageway. 100,000-gal. standby fuel oil tank. 300,000-gal. water tank.	Sewage disposal plant at rear of property. Existing brick & granite bldg. (purchased with property) used for hot galvanizing.	40' x 40' volatile solvent building, 100' W. of main plant. Constructed & wired for explosion-proof specifications.	74,000-sq. ft. of service buildings: Boiler Hse.; mtce; garage; pump hse. Also: water, oil, gas, acid, & waste treatment houses.
	Parking	500 cars, at one side & rear of plant.	46 paved acres for employees & for new cars.	650 cars.	16 car visitor lot, front; 165 car employee lot at rear.	Visitors: 12. Employees: 60. Conc. paving.	1 300-car lot; 2 similar lots can be paved later.	3 lots for 1,000 cars.	20 visitors; 640 employees. (1000 eventual.)	220-car capacity at present.	East & West lots: 3000 cars each. Visitors: 80 cars.
	Rail	120' inside; can be extended at expansion.	1 spur inside 2 opposite sides of plant. Spur also to B.H., paint mix.	Available if needed from two RR lines across the street.	None.	Rail terminal 22 miles east.	4 spurs.	Construction spur remains for special uses.	2 unloading & scrap spurs, 1 shipping spur.	Siding with 2 rail doors now; more for future growth.	3 spurs inside; plus fuel spur.
	Access roads	City streets serve as perimeter loop.	Perimeter network to all bldgs. & facilities. Excellent access to U.S. No. 66.	Single entrance to parking lot & truck apron.	Single road into property from industrial park.	Heavy duty conc. road to state highway (0.3 mi.). Nearly 100% yard paving (conc.).	Paved network, plus extensive paving between all bldgs. for traffic flow.	Excellent perimeter and parking lot network.	2 entrance roads from highway. Perimeter road. Gravel road to sewage plant. Parking lot is below plant floor grade. Tunnel at mid-edge of lot leads to center of plant.	Conc. access roads from each of 2 streets: 1 for rec., 1 for shipping & parking.	To each parking lot, to services at rear, to recreation acreage behind plant.
	Special areas	None.	Unique switchyards and sidings developed with Frisco RR for piggyback transport of new cars.	2 landscaped reservoir lagoons and 1 settling lagoon between office & highway.	2 acres of recreational land cleared at rear. Wooded area betw. plant & river-edge park cleared for view.	At rail terminal: Storage silos, for loading hopper cars; bagged cement warehouse, for box cars.	RR spur connects with nearby Md. Port Auth. pier for unloading copper blister from ocean freighters.	Front corner of expansion property deeded to city for new fire station.	Parking lot is below plant floor grade. Tunnel at mid-edge of lot leads to center of plant.	400' x 400' space graded for baseball.	Recreation fields, park, shelter, completely fenced with private road access.

ELECTRICAL

SUPPLY	Voltage	7200 volts.	34.5-kv.	4360 volts.	208 volts.	46-kv.	34.5-kv.	13.2-kv.	25.7-kv.	69-kv.	13.2-kv.
	Alternate feed	None.	From opposite directions.	Utility construct-ing alt. line.	None.	None.	2 full capacity feeders.	Future plans by utility.	Aux. supply from utility.	Through loop feed from 2 utilities.	2 sep. feeders.
	Type of switching		Manual.	Will be automatic.			Manual.	Will be automatic.	Manual.	Manual.	Manual.
MAIN SUBSTATION	Location	Does not apply.	Next to B.H. at rear of plant.	Abuts plant at rear.	100 yards off property.	Fenced enclosure at NW corner.	Rear center.	Indoors, next to boiler house.	Outside, near center of plant.	Outdoors, beside mfg.	Acr. highway from fr. of plant.
	Ownership	Does not apply		Utility.	Utility.	Utility.	Kennecott.	Royal McBee.	Screw & Bolt.	Joint.	Utility.
	Transformer capacity	Does not apply.	2 10,000-kva., 34.5 to 12.47-kv.	1 at 2500-kw.; 4360 to 480-volt.	3 100-kva. (208/120v. Sec.).	7500/9250-kva.; 46 to 4.16-kv.	2 10,000-kva. 2 9375-kva.	Load center subs. only.	2-5000-kva. 25.7 to 13-kv.	2 2500-kva; 69- to 4.16-kv.	
	Switchgear Description		Double ended, in door, metal clad, in B.H.	Metal clad. Set in bldg. wall. insulated back projects out of bldg.	None.	Metal clad, indoor type.	Indoor, metal clad.	Metal clad 15-kv.	Metal clad, fused interrupter switches.	4160-v., outdoor, metal clad with enclosed operating aisle.	Double-ended, with tie-breaker. Metal clad, in office vault.
	Breaker ratings		15-kv., 250,000-kva.	From 125 to 1600 amp.		4160 v., 600 amps.	34.5 to 13.8-kv. 1200 amp., 1500 mva.	1200 amp. 250,000-kva.		1200 amp. 4160 v.	500 mva. 2000-amp. main & tie breakers.
	Metering (excl. util.)		Each feeder cubicle: kw-hr., ammeter.	None.		Volt-, watt-var, demand, ammeter in switchgear bus. Kw-hr. & ammeter in each feeder.	Primary of arc furnace transformers, secondaries of main transformers.	Ammeter; voltmeter; wattmeter; var meter.	None.	Ammeter; voltmeter.	On each feeder: ammeter. On each kw.-hr., bus: ammeter, voltmeter.
PRIMARY DISTRIBUTION	Type	Does not apply.	Primary selective.	None.	None.	Radial.	Primary selective.	Radial.	Primary selective loop.	Radial.	Primary dual radial selective.
	Reason for choice		Reliability at minimum cost.			Economy.	Reliability, flexibility.	Economical, expandable.	Continuity, economy.	Economy, simplicity, no critical loads.	Reliability, flexibility.
	Provisions for future		4 additional breaker positions. Rail extensions &	Present main sub. can be used as distribution sub.		Space for add'l. 9250-kva. transformer, main	2 additional primary transformers.	Can add 4th load center sub. in plant area.	Feeder loop and substation designed for third	Space for larger transformers & 200% more sw'g'r.,	Extra bus capacity in main switchgear.

PRIMARY DISTR.			Rail extensions & conduit in place.			5250-kva. transformer, main breaker, new incoming line, tie, & feeder breakers.					
	Primary conductors		Underground to mfg. & aux. bldgs., then overhead in alum. cable racks.			5-kv. shielded conductors, conc.-encased ducts, cable trays in tunnels & vaults.	Neoprene 15-kv. cables in underground conduit.	Butyl rubber cables in steel conduit. In bldg. trusses.	Interlocked armored cable.	Single conductor 5-kv. underground, 3-conductor 5-kv. interlocked armored cable.	Steel conduit, overhead; aluminum cables.
LOAD CENTER SUBSTATIONS	Types	Indoor type 1500-kva. 720 to 480-v.	7 double-, 2 single-ended, at 1000-kva. per end. 2 1500-kva. double-ended, for welding. 2000-kva. double-ended, in B.H. All 12.47- to 480-v. delta.	1 1600 amp. power panel only.	1 1600 amp. switching center only.	8 metal clad, single ended, askarel-cooled. 4160 to 480/277-v. 300 to 1500-kva.	Indoor, dry transformers, air circuit breakers.	2 1000 kva. 2 750 kva. 13,200 to 480/277-v. dry transformers.	8 substations, each with 1 or 2 1000/1150-kva. transformers. Forced air cooled.	Load center types, at 1000-kva. with askarel cooled transformer.	10 double-ended, 8 single-ended. Ratings: 750 & 1500-kva., 13.2 to 480/277-v. Dry type.
	Locations	Penthouse near rear center. (Will be at future center).	In roof penthouses, symetrically spaced in rows.			Elec. equip. rooms & principal bldgs.	Load center rooms throughout refinery.	Above 3 service cores, and in B.H.	On mezz. platforms throughout plant.	2, in main mfg. bldg., on opposite sides.	Office; mfg; B.H.; principally in penthouses.
	Reasons for choice of location	Voltage regulation, expandability, economy.	No interference with future prod. layouts.			Close as possible to each principal load.	Near principal loads.	Near centers of power loads.	Production center flexibility.	Present & future load density & feeder economy.	Penthouses symmetrically located for shortest path to 18 load areas.
	Primary switching	Load break fused air disconnect.	Interlocked air circuit breakers.			Air switch, key interlocked.	Air switches.	Load break air switches.	Fused air disconnects.	None.	Fused air switches.
	Metering	Voltmeter; ammeter; with demand register.	Ammeter in each 480-v. sub. bus.	Complete, for heat pump load only.	None.	Ammeter, voltmeter, kw-hr. on secondary bus.	Process & lighting metered separately. (kw-hr. demand.)	Secondary bus ammeter.	Voltmeter, ammeter, & P.F.	Ammeter & voltmeter.	B.H. subs. have volt & ammeter.
SECONDARY DISTRIBUTION	Types	Radial.	Radial.	Radial. Delta ungrounded.	Radial.	Radial.	Radial.	Radial.	Radial.	Radial, with normally open tie between the 2 load centers.	480/277-v. radial, with tie feeders to adjacent subs.
	Reasons for choice	Economy	No downtime for circuit grounds.	Arrangement with utility.	Economy.	Economy.	Concentration of loads.	Economy.	Economy.	Economy, simplicity.	Reliability.
	Provisions for future	33% expansion, including cubicle space for future sec. breakers.	Each sub. can be made double-ended. Space for additional feeder breakers.	Spare conduit in floor. Oversized bus duct.	Space for 200% additional gear.	All subs., motor control centers, & panel boards have spare space.	Spare conduits at all unit subs.	Plan for add'l. 750-kva. sub.	25% expandability.	Space for added breakers and load center subs.	10 750-kva. subs. expan. to 1500-kva. (double-ended). 25% ex. cap. in mfg.
	Conductors	400 amp. alum. bus duct; RHW conductors in conduit.	Continuous 400-amp. 600-v. alum. bus on 90° c't'rs; 1600-amp. weld'g bus.	4" x 4" trough, bus duct, conduit, underfloor raceway.	Conduit, trolley duct, lay-in duct.	RHW cable in u'ground conc. asb. encased ducts; cable trays; conduit	Overhead and underground circuit.	Conduit and 400-amp. bus duct.	Bus duct, raceway, conduit.	Interlocked armor, plus bus duct.	Primarily 600-amp. bus duct.
	Grounded system	Yes.	Ungrounded, with warning lights.	Ungrounded.	Yes.	Yes. (Neutral not carried to loads.)	Yes.	Yes.	Yes.	Yes.	Yes.
MOTOR CONTROL CIRCUITRY	Any high voltage motors	None.	None.	None.	None.	4 4160-v. mill, crusher, and kiln motors.	None.	None.	None.	See item below.	None.
	Motor control centers	Substation breakers & power panels.	Control center in assembly areas; in each sub. for bldg. facilities equip.; in B.H.	Supervisory & data center for heat pump control.	None.	125-hp. motors & smaller: controlled by lo-voltage breakers in unit subs.	In all process areas.	In B.H. Also in electro-static paint spraying system.	Mostly individual magnetic starters.	1 for large 4160-v. process motors; 1 for M-G sets; 1 for B.H.	Yes.
P. F. EQUIP.	Type and rating	None.	.8 P.F. syn. c'm-pr's'r m't'rs. Co-pacitors for all 25-	None	None	2 1250 hp. synchronous mill motors.	None.	Will be capacitor bank.	300-kvar. hi-volt. capacitors at main subs.; 480-v. units	1050 hp. .8 P.F. syn. mill motors; 45-kvar. capaci-	3 500 hp. synchronous motor drives.

P. F. EQUIP.	Type and rating	None.	.8 P.F. syn. c'm-pr's'r m't'rs. Capacitors for all 25-hp. m't'rs & larger.	None	None	2 1250 hp. synchronous mill motors.	None.	Will be capacitor bank.	300-kvar. hi-volt. capacitors at main subs.; 480-v. units on large motors.	1050 hp. .8 P.F. syn. mill motors; 45-kvar. capacitors on compressor motor.	3 500 hp. synchronous motor drives.
D-C POWER SYSTEMS	Source	None.	None.	3 metallic rectifiers.	None.	M-G sets; Battery sets; rectifiers.	Silicon semi-conductor rectifiers; auto. load reg.	Rectifiers.	Synchronous MG sets.	None.	Several special-purpose rectifiers.
	Rating	None.	None.	6 & 9-v.; 300, 1000, & 1500 amp.	None.	Vary from 1-kw. to 50-kw., plus 150-hp. kiln drive.	3 at 3000-kw. 1 at 500-kw. 1 at 250-kw.	15 units, totalling 31,150-a.; 150-a. 6-v. to 10,000-a. 12-v.	200-kw.	2 12 kw. M-G sets; several smaller.	
	Function	None.	None.	Electroplating.	None.	Field excitation, breaker operation, spotting power for mills.	Furnish 20,000 amp. for electrolytic refining.	Electroplating power supply.	D-C motor supply.	Package drives.	Product testing.
LIGHTING SYSTEMS: Type/ft.-c.	Main office	Fluor/70	Fluor/70	Fluor/50	Fluor/65	Fluor/100	Fluor/50 & 120	Fluor/75	Fluor/75	Fluor/80	Fluor/50
	In-plant offices	Fluor/70	Fluor/50	Fluor/50	Fluor/65	Fluor/100	Fluor/70	Fluor/75	Fluor/45	Fluor/70	Fluor/50
	Main production	Fluor/35	Fluor/50 & 65	Fluor/35 to 85	Fluor/100 & 150	MV/30;incand/30	MV/30	Fluor/50 & 90	Fluor/45	Fluor/55	Fluor/50 (low bay). MV/50 (high bay).
	Warehouse	Fluor/35	Fluor/40 & lower.	Fluor/15	Fluor/35	Incand/10	Fluor/30	Fluor/50	Fluor/30	Fluor/30	Fluor/50
	Receiving/shipping	Fluor/35	Fluor/40 & lower.	Fluor/80	Fluor/65	Incand/30	Fluor/30	Fluor/50	Fluor/30	Fluor/35	MV/50
	Parking	Incand. floodlights.	1000-w. MV lamps operated at 700-w.	400-w. MV lamps on 100' centers.	Incand/1/2	MV on 26' poles.	Incand/2 1/2	Incand/1 1/2	Incand/1/2	Incand/750w.	1000-w. incand. on aluminum poles
	Special areas	Eng'ng.: 125 ft.-c. Inspec.: 120 ft.-c.		Solar-controlled signs.		Control room: adjustable from 0 to 50 ft.-c.			Mach. shop: 75	Dust-tight Incand/ 30	43,000-sq.ft. of high intensity lighting.
	Emergency lighting	None.	Battery operated package units.	In fire pump pit, from 7-kw. emergency generator.	None.	Package units, & selected lights from emerg'cy gen.	Package units, & selected lights from emerg'cy gen.	Battery operated package units.	None.	Weekend light switching.	See below.
EMERG. POWER	Type & rating	None.	Standby generator.	Gas. engine, 7-kw.	None.	Diesel, 150-kw.	Gas. engine, 150-kw.	None.	None.	None.	Diesel, 500-kva.
	Function	None.	For time clock & poging system.	Lighting.	None.	Lighting, emergency kiln drive.	Lighting, & critical refinery loads.	None.	None.	None.	Light, boiler service, & fire pump.
IN-PLANT COMMUNICATIONS	Phone system	Single position switchboard in new plant, expandable to 2.	2 exchanges (Victor and DAvis) at plant. 15 trunks, expandable to 21.	200 dial phones; expan. to 800. 1 manual swbd.; expan. to 2nd.	Single position; 10 trunk lines, 10 reserved for future.	In-plant Bell system. Room in conduit for expansion.	Complete network.	2 position switchboard.	2 pos. swbd; 17 Pittsb'gh & local trunks, 92 phones, expan. to 140.	300 station dial, 50 used at	4 pos. dial PBX with 1200 lines, approx. 2/3 loaded. 45/66 trunks.
	PA system	None.	None.	40-sta. inter-com.; 3 sep. amplifiers in office & vicin., both priv. & poging.	Throughout, with Muzak over some speakers in cafeteria & mfg. (via FM.)	None	In most buildings, some outdoor areas.	None.	None.	PA system for alarm, time, voice, music.	Music & PA from proj. room of auditorium. Serves audit. & 2 cafeterias.
	Automatic printers and writers	TeleType	In-plant TeleType for production. TeleType to other plants. TWX & WU.	W.U. & TeleType.	TeleType	TeleType to Denver headquarters.	WU & Teletype.		WU, Bell TWX.	Direct wire to general offices in Dayton.	TWP service available, TWX on order.
	Pneumatic tube	None.	None.	From office to assembly dept.	None.	From office to packhouse.		None.	None.	None.	None.
	Other	Intercom reporting to central timekeeping office.	Poging by signals over time clock system.	Time signal tied in with PA system.	Time clock signal sounded over PA system.	Code poging by horns. 2-way radio for mtce. TV for kiln.	2-way radio for veh. dispatching. Radio poging & TV in future.	Autocall comb. fire alarm & watch patrol system.	Autocall system.	None.	Sep. fire & watch PBX. 70 fire phones. Deactivated by guard for reporting.

PLANT SERVICES

PLANT	Location	Near center of	Rear of assembly	Heat pump area is	Rear corner of	Does not apply	Penthouse above	Behind right rear	N.W. corner	Attached to front	NE corner of plant

BOILER PLANT										
Location	Near center of old plant.	Rear of assembly bldg., NW corner.	Heat pump area is part of 1 Butler bay.	Rear corner of service wing.	Does not apply.	Penthouse above reverber. furnaces.	Behind right rear corner of plant, connected.	N.W. corner.	Attached to front (south) permanent wall of mfg. bldg.	NE corner of plant. Tunnel for service lines.
Description (if separate)	95' x 98' brick building. Formerly contained 9 straight tube boilers. (2 remain.)	Sim. constr. to m'f'g: tilt-up glass, alum., steel framing. Exception: 1st fl. front wall of operable glass.	45' x 50' area; no perimeter partitions exc. outside wall of louvered brick for evap. condensers.			Corr. asb. siding & translucent panels on steel framing. Precast conc. slab roof.	Same construction as plant.	Lean-to, attached to main building. Concrete block, steel roof deck.		Same type construction as main building.
Expandability	Plenty of space now for adding new boilers.	Can take 4th air c'mpr's'r. Then plant expan. would need B.H. expan. to south.	15% surplus capacity in heat pump equip. prior to adding plant space.	Space in boiler room for doubling equipment to care for expanded plant.		Along with production expansion.	Space for all types of equip. All headers flanged & capped.	Space for 2nd boiler. Note: office is heated by package boiler in 2nd fl. equip. room.	Can expand forward in 20' x 40' increments.	Space for add'l boiler, feed water pump. 25% add'l air & chiller cap. can be added.
Principal equipment	New plant integrated with old plant across street. Old boiler house updated, incl. 2 new boilers.	3 automatic chain gate stoker-type boilers. 3 horizontal duplex air compressors.	All-electric plant; has no conventional boiler rooms.	Package boiler.	No conventional boiler house. Office heat & hot water originates in small heating plant in basem't.	2 process & comfort heating boilers.	2 boilers, 2 centrif. refrig. machines.	Process steam boiler, for bar pickling.	Packaged boiler, relocated & modernized.	3 steam generators; 3 air compressors.
Sizes or capacities	1 35,000-lb./hr. 1 50,000-lb./hr. (Old: 2 17,000-lb./hr. stokers.)	90,000-lb./hr. steam at 150-psi. 600-hp. compressors: 3000 cfm. 100-psi.	Three sep. heat pump systems, ea. with 8-cyl. 75-hp.; 12-cyl. 120-hp. & 100-hp. c'mpr's'rs.	70-hp. 30-psi.		40,000 lb./hr. each, at 150-psi.	35,000 lb./hr. 650 tons.	80-hp., 2760 lb./hr. Unattended.	30,000-lb./hr., 250-psi. capacity, operates on 160-psi. at present.	65,000-lb./hr. 250 cfm.
Fuel	Coal, wood refuse from bowling pin manufacture, etc.	Coal.		Natural gas	Natural gas for office.	Natural gas, plus waste heat from reverberatory furnaces.	Natural gas; No. 6 fuel oil standby.	Natural gas.	Natural gas; No. 6 fuel oil standby.	Natural gas; fuel oil standby. Can be converted to coal.
Accessory equipment Items	Feedwater heater, feedwater pump, coal handlers, ash handlers. Note: separate air compressor in new plant.	Chiller for cutting heat & humidity from supply air to assembly tools. Auto. coal & ash conveyors. Coal bunkers. Ash silos.	Water softeners & filters (in pump vault). Heat pump area: evaporative condensers, receiver, exchangers.	Chilled water compressor.	Operating air & mtce. air come from compressors located in mill bldg. Standby compressors also in mill building.	Air compressors.	3-cell cooling tower on B.H. roof. 2 air compressors 660-cfm.	Air compressor.	Air compressor, standby air compressor.	3 turbine driven chillers for office, lab., cafeteria, & special shop air conditioning.
Sizes or capacities	Air: 950 cfm. at 110-psi.	50-hp. 12,000-gpm. chiller: 105-deg. air down to 75-deg.		75 tons, supplementing well water.		300-psi.		475 cfm. Water cooled. Standby: 360 cfm. Air cooled.	125-hp., 75-hp.	600 tons each.
Fuel	Electric.	Steam.	Electric.	Electric.	Electric.	Electric.	Electric.	Electric.	440-v. motors.	Steam for turbines.
SERVICES										
Principal services supplied Items	High pressure steam, compressed air.	Steam, dehumidified compressed air.	Industrial water, from lagoons (rain water source); Potable water, from deep wells.	Cool. water, via 15-hp. 200-gpm., pump, with disp'rs'n well for return; H.W. for perim. heat & air cond. heat.	Treated water; standby fuel oil; cool. water; op'r't'g air; mtce. air for pneu. tools.	Steam: 300-psi. air; 15-psi. air; instrument air; chilled water.	Steam: 125-psi. Air: 100-psi. Chilled water.	Compressed air, recirculating water, sewage treatment.	Service water from deep well, steam, air.	Compressed air, steam, chilled water, hot water, cold water, process water.
Distribution	Mains: To new plant via tunnel under street. In trusses within plant. Steam by branch networks. Air: 4" loop.	From B.H., overhead to & through assembly plant.	Sep. pumps & piping systems for: process., 7-acre lawn sprinkler system, fire system, domestic needs.	Overhead piping; some in perimeter loops, some near eventual center of manufacturing.	Comb. d'm'st'c & fire system perim. loop. Single line fuel transport, with low-volt. heating. Recirc. cooling. Sep. air lines. (See above)	Largely by underground pipe networks.	Perim. loops, with cross-ties at midpoints. Valved to isolate sections for mtce. & repairs.	Air: plant loop. Recirc. water: fr. backyard system of oil skimmer, res. & cool. t'w'r. Grav. return; pumped supply.	Overhead piping. Water: Main headers parallel to front (permanent) wall. Steam & air: gridded; with expansion tees.	Loops within loop in mfg. bldg.

TOP PLANTS OF 1960 — SPECIFICATIONS SHOWCASE (cont.)

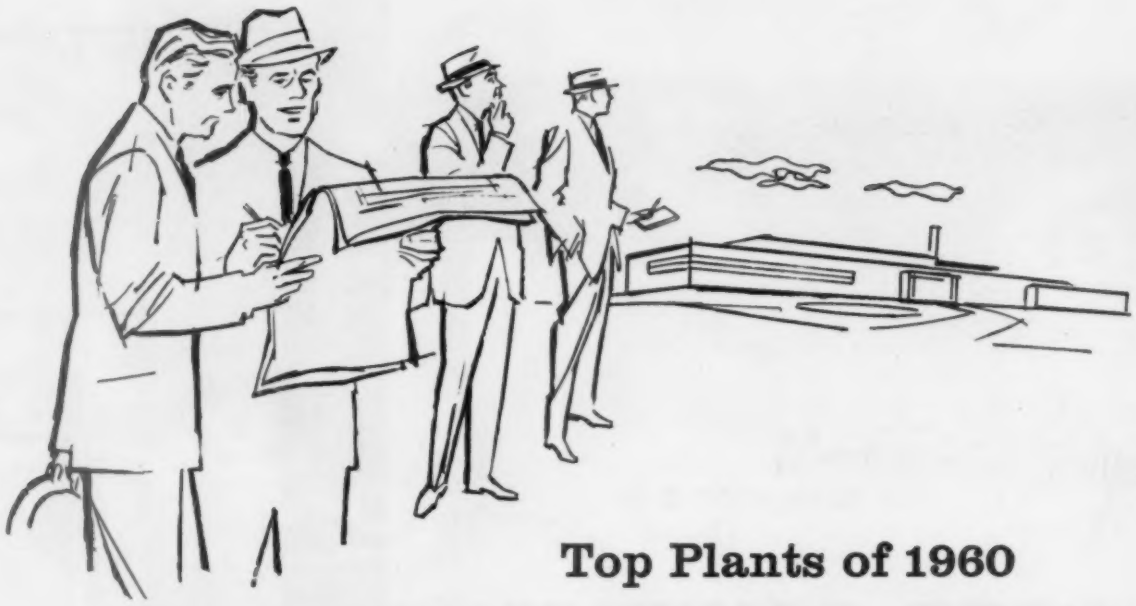
		BRUNSWICK	CHRYSLER	FLICK-REEDY	G-V CONTROLS	IDEAL CEMENT	KENNECOTT REFINING	ROYAL McBEE	SCREW and BOLT	SPRINGDAY	WESTERN ELECTRIC
SERVICES (cont.)	Flexibility	Plugged tees every 80 or 100 feet.	Capped tee per bay.	Frequent capped tees.	One or more capped tees per bay.	All service lines sized for twice orig. plant cap.	Moderate.	Capped tees.	Capped tees.	Water: sized to take full well cap. Sub-mains to be added.	Readily changed to meet needs.
	Expandability	Steam: sized for 150,000-sq.ft. bldg. expan. Air: add 2nd c'mpr's'r.	Lines sized for substantial expansion.	One standby well.	Lines sized for twice initial needs.	Tees & blind flanges in all supply lines for current expansion.	100% plus.	Sized for future, with capped tees for expansion program.	Oversized lines.	Mains will carry over twice the initial load.	Using less than 50% of cap. Space for add'l pumps, etc.
	Principal services purchased Items	Gas, city water.	Gas, county water.	None, in the same sense as other 9 plants. (All-electric plant.)	Gas, domestic water.	Gas.	Gas, water, heavy fuel oil, light fuel oil, propane.	Gas, domestic water.	Gas, water.	Gas, domestic water from city.	Gas, city water.
	Distribution	Water: Network system off main. Gas: Direct lines off main to using areas. Both: in trusses.	Gas: 1 12" line; duplex red. & distrib. to point of use; there reduced to oper. press. Water: 12" main, to elev. tank.		Overhead piping. Note: sewer line has many future connections.	Underground, in wrapped lines with cathodic protection.	Largely by underground pipe networks.	Separate gas lines to B.H. and to plant.	Gas: from 150-psi. sta., red. to 15-psi., then to 2 supply feeders: 10-psi.; 16 oz. Water: 12" municip. line.	Water: 8" u'ground main, then o'head along front wall with take-off mains & subs. Gas: to B.H. only.	Loops within loop in mfg.; radial in office & service bldgs.
	Flexibility	Plugged tees	Multiple variable control units vary outout.		One or more capped tees per bay.	Sized for 2X orig. needs. By-posses around ac's'ries.	Moderate.	Capped tees.		Plugged tees.	Readily changed.
	Expandibility	Water: OK for 150,000-sq.ft. bldg. expan. Gas: New supply at rear will be tapped.	Bldg. area, piping, & floor slab designed to permit add'l outlets without disrupting exist. s'v'c's.		Lines sized for twice initial needs.	Tees and blind flanges for future equip. service lines.	100% plus.	Sized for plant growth.	Oversized lines.	Sized for plant growth.	Using less than 50% of service line Space for add'l pumps pumps & accessories
DISPOSAL FACILITIES	Sewage	To city system.	Pumped & piped to 2 lagoons (8 acres) for treatment. Complies with state & local laws.	Conc. tr'tm'nt tank, comminutor & cavitator, effl'nt lagoon; out to Chicago San. Dist.	To community disposal plant via 2 alternating pumps at 3-hp., 150-gpm.	2 septic tanks with leaching fields.	2 lift stations bring sewage to disposal plant; effluent discharged 800' out in Patapsco River.	By gravity through flow meter to city system.	Complete sewage treatment plant, 1200 person capacity, Imhof septic tank, auto. chlor. control.	To city system.	To city system.
	Storm drainage	To city system.	To Meromec River behind plant.	Conserved from roofs and parking lots into lagoons.	To storm drain, thence to river.	To conc. trench (removable covers) & to stream bed.	2 main storm drains to river.	By gravity to city system.	Concrete pipe to nearby creek.	To 30" concrete tile drain, & 3000' to open creek.	To city system.
	Process effluent	Small quantity of wash water to city system.	Indust. wastes chem. treated in blending tanks, then to settling lagoons, & to river.	Stored, neutralized, thence to sanitary disposal system.	None.	None.	Refinery sludge retained for precious metal refining elsewhere.	To waste treatment & neutralizing system, then to city sewer.	Spent pickling liquor: by contract hauler, in tank trailer.	Waste water only, into storm sewer.	Chemical waste treated prior to disposal into city sewage system.
	Scrap disposal	Via Load Lugger bins to scrap dealer.	Contract.	Collected separately at dock for scavenger.	Public scavenger	Mtce. scrap segregated into conc. stalls.	Sold to outside treatment plants.	Oil reclaimed from chips, scrap sold.	Metal scrap sold in RR car lots. Underfl. conv. to gondola car.	See below.	Contract.
	Waste disposal	To city dump, using load lugger bins.	Contract.	To incinerator.	Some.	Buried in a trench in nearby canyon.	By Load-Lugger bins until incin. is completed.	Contract.	Contract haul-away to disposal area.	See below.	Contract.
	Contract haul-away	Does not apply.		For scrap, for oil wastes.	None.	Does not apply.	Yes, temporarily.	Contract.	Yes.	Contractor; to city landfill.	Yes.
	Incinerator	None.	None. Burnables handled near rear of property.	Part of plant wall, interior & exterior fire doors.	None.	Double-pass industrial type.	Under construction.	None.	Future plans.	None.	None.
HANDLING	Heating	Plant: steam heated vert. unit h't'rs & make-up air units. Office: warm air ducts, perim. radiation	Penthouse units supply steam-heated filtered air to ducts to plenums built around 1st fl. coils	Hot water from heat pump receiver pumped to 13 air handlers each with duct system.	2 5-zone air units in penthouse carry heated (or chilled) air. Augmented by perimeter heating	Office: gas fired H.W. Mtce: Infrared units, gas. Control room: gas fired hot air. Other: gas unit	By unit heaters where process heat is not adequate.	Fin-tube radiation on all exterior walls of plant (200F. water). Interior by warm air	Fully automatic gas-fired unit heaters, in trusses. Office: Hot water perimeter heating, hot air ducts.	By steam-heated ceiling-mounted units with ducts & grilles. Main area: pos. press.; compounding area:	Hot air from penthouse units partially recessed in truss space. H.W. fin tube radiation at perim. walls.

AIR HANDLING										
	warm air ducts, perim. radiation.	built around 1st fl. cols.	duct system.	mented by perim-eter heating.	gas fired hot air. Other: gas unit heaters; portable butane infra-red.	quate.	terior by warm air.	perimeter heating, hot air ducts.	grilles. Main area: pos. press.; compounding area: neg.	truss space. H.W. fin tube radiation at perim. walls.
Ventilation	4 air units supply 60,000-cfm. to re-place exhausts from weld. & paint dept's. Plus: 4 15,000-cfm. roof exhausters for summer.	Nat'r'l draft & pow'r'd vents in periodic bays. 4' X 4' roof openings identical; pow'r'd units can replace the natural units.	Outside dampers in air handlers.	Outside dampers in penthouse air handlers.	Powered exhausters in lab., mtce., mill, kiln, & packhouse. Also: gravity type roof vents, rolling steel doors.	Roof ventilators (mostly powered) on all buildings.	10 roof exhausters for in-between seasons.	Modulating heat-ers & fans.	Summer ventila-tion by some units.	Penthouses can bring in 0 to 100% outside air.
Air conditioning Process	None.	Make-up air for mezz. paint booths, ovens filtered by Rollamatics. Chill-ers at oven exits.	Virtually 100% air cond. in office & plant.	Plant completely air cond. exc. for boiler room.	Chemical lab.	For cooling rectifi-fiers & heavy elec. equip. (air-water-air cooling sys-tem under press.)	Completely air cond. except for central core of metal finishing.	None.	None.	Special shop & laboratory areas.
Comfort	Office wing.	Main office, in-plant office. Spot cooling of hi-heat areas.	See above.	Office & lab. completely air conditioned.	Office bldg, con-trol room, pack-house office.	Production offices, lab., main office, industrial rela-tions building.	See above.	Office wing: re-frigeration type with recirculated super-heated hot water.	Office wing only, by package units (65-T). Central sta. equip. for office expan.	Offices & cafeterias.
Process exhaust Booths	All welding booths, paint booth, paint oven, washer phosphating.	Toxic & harmful areas: paint, ad-h's've, dead'n'r weld., sold'r'ng, baking.	Paint spray, welding.	Soldering & paint rooms.	None.	Over dust & ob-noxious gas-pro-ducing operations.	Separate exhausts for paint booths, plating tanks.	Pickling tanks have push-pull exhaust hoods.	None.	For heat treating, metal processing, painting, etc.
Isolated areas	None.	Ducts from as-sembly lines, pits, engine test stands, etc.	Metal plating: recirculated air, through scrub-bers.	None.	None.		Central core: sup-ply & exhaust sys-tems.	Hot galv'n'z'g in sep. bldg., to isolate corrosion & fume problems.	High vel. roof vent'l'f'rs over steam cur-ing; hoods un-necessary.	None.
Air pollution control	Does not apply.	Obnoxious fumes exhausted through water spray booths.	None, except for item above.	Does not apply.	Effluent gases from kiln: cooled, cycloned, & into glass-bag dust collector. 7% other dusty points vented to bag collectors.	Copper oxide by-product flue dust from arc furnace fumes collected in dry bag house unit.	None.	Pickling tank exhaust: water mist scrubbing.	See below.	Does not apply.
Dust removal	Portable dust col-lectors at grind-ers.	All other booths exhaust through replaceable filters.	Precipitrons in 3 office & 1 plant air handlers.	No special need other than filters in blowers.		Key areas hooded & exhausted.	Isolated filter systems.	None.	Bag-type collect-ors remove dust at Bonbury, return dust to some batch.	Special machining operations only.
Controlled-condition rooms	None.	Hot rooms: test air conditioners Steam room: check paint quality. Wa-ter-test room.	Swimming pool temp. & humidity controlled via office plenum exhaust.	Noise control room in Research & Eev. lab.	Air cond. & sound deadened control room. Pressurized elec. rooms.	Laboratory assay rooms.	None.	Pressurized fresh air for induction-heating generator room.	3 "hot" rooms for temperature & humidity control of stored rubber.	Calibrated tools testing room.
FACILITIES										
Lockers & toilets	2 main areas, in diagonally opp. corners of square plant. Lightweight block partitions, glazed tile wain-scot. Pastels.	Assembly bldg., 10 toilet rooms 15' x 45' are sus-pended from truss-es, 13 feet above floor.	Conc. at person-nel entr. Aux. rooms near cafet. All wall-hung units. Spray-glazed block walls.	In service wing along entr. corr. from main park-ing lot at rear. Plumbing in-stalled for expansion.	Rear wing of of-fice contains main locker & shower area. Toilets also in crusher, mill, mtce., & pack-house bldgs.	Located in change house at gate en-trance beside parking lot. Addi-tional facilities in mtce. bldg. & in key work areas.	4 large toilet & locker cores in plant; 1 for office & cafeteria. Ter-razzo floors, tile walls, ceiling-hung partitions.	5 locker and toilet rooms throughout plant, on platforms. Include shower & drying rooms.	Prin. facilities in office wing. Second area for 2nd fl. "carbon black" dept., 2 sets of lockers per man, with showers betw. the 2 sets.	Tiled locker & toilet cores on all sides of mfg., key interior spots, all office floors, & aux. bldgs
Eating facilities Cafeteria	Main cafet. in old plant; enlarged. Access: via tun-nel. New plant: railing-enclosed table area, com-plete vend. bank. Asphalt tile.	2 cafeterias in factory; 1 in of-fice. Food pre-pared in kitchen of office cafe-teria.	Fully equipped kitchen; glass walled dining area overlooks lagoons & O'Hare Airport. Outdoor dining terrace.	2000-sq. ft. cafet. seats 125 people. Fully equipped kitchen. Picture window wall looks out to din. Ter. & view of woods & river.	Picture-windowed, brightly-colored lunchroom in of-fice wing. Em-ployees bring own lunches & snacks. No kitchen equipment.	Vending machine banks & table areas in 4 loca-tions: administra-tive, casting, tank-house, mtce.	Window walls on 3 sides (part of of-fice "tee"). Seats 400; serves 1200 in 1 1/2 hours. 3 checkouts.	300-cap. cafet. rear of office. Complete kitchen equip. Full picture windows on 2 cor-ner sides overlook lawns & country-side. Outside ac-cess.	Lunchroom next to locker area, with one interior wall lined with selec-tion of vend. ma-chines. Smaller bank near 2nd fl. locker area.	2 main cafeterias (SE & SW corners, with full windows) plus satellite cafet. near rear. One food prep. center. Kitchen for office 4th floor conf. rooms.
EMPLOYEE										
Snack carts Vending machines	None. Hot & cold items, candy, cigar-ettes.	None. Candy, cigarettes, soft drinks, in key locations.	None. Amply spaced along entr. aisle, & in cafet.	None. Cigarette & candy machines in cafet.	None. None.	None. As above.	For office. Banks at each of 4 service cores, plus pay phone.	None. Candy & cigarettes at mfg. & office restrooms & at cafet.	None. Vend. bank unified with cut-out facade.	None. Cigarettes.
How staffed	Main cafeteria, caterer.	Caterer; cafe-teria & vend.	Caterer.	Private contractor.	Does not apply.		National caterer.	Caterer.	Contract.	Contract.
Medical Staff	Full time nurse. Doctor: A.M. visits.	Full-time doctor, 4 nurses.	First aid trained employees.	First aid trained supervisors, doctor on call.	None, exc. F.A. trained em-ployees.	Full time nurse. Doctor at posted periods.	Nurse.	Full time nurse. Doctor: mornings and on call.	Full time nurse. Visiting doctor.	2 part time doc-tors. 4 full time nurses. Lab & X-ray tech's. Comprehensive.
Extend of facility	First aid, with treatment rooms, beds, etc.	Complete med. center, for any emergency.	4-bed ward, exam. room.	First aid dispensary.	First aid equip. in 24-hr. control room.	First aid room with extensive ex-amining facilities.	First aid facilities.	Compact hospital equipped for minor operations.	Small med. room at present, for F.A. treatment.	
Location	Across street, in in existing plant.	F.A. room in in-plant office, near center of factory	Near plant en-trance, beside personnel	Service wing, along entrance corridor	As above & in office of safety dir.	Industrial rela-tions bldg., beside change house	Corridor between office & plant.	1st floor of office wing, next to plant	Personnel area, next to plant.	One wing of dou-ble tee, betw. plant & mfg.

	Community facilities	2 major hospitals & 6 ambulance services.	Ambulance contract to community hospital (10 min.).	Clinics 1-1/2 miles; hospital 5 miles.	5 min. from new hosp. under constr. Community vol. F.A. squad.	Albuquerque facilities approx. 10 miles away.	Baltimore hospitals 1/2 hr. distant.	Excellent clinic, 1 mile. Modern hosp., 2 miles.	Hospital: 1 1/2 miles.	City of Springfield med. facil. less than 15 min.	Short drive to Columbus hospital.
	Recreation Principal facilities	Large recreation room beside existing plant cafeteria.	None.	40' x 60' swimming pool, 70' x 85' gym., 12' x 14' library, 2 grassed acres & 2 stocked lagoons.	2 acres cleared for softball, archery, volleyball, family picnics. Parking & facilities open weekends.	None.	None.	None on premises. Company groups use existing community facil. for golf, bowling, etc.	None at present.	Baseball diamond City golf course projected behind site.	Rec. & games area behind plant, with pavilion & rest facil. Rec. areas in cafeterias.
	Special facilities	100-cap. audit. in exist. plant. New plant: 16' x 30' conf. rm., with proj., sound, chalkboards. Library.	Executive garage at rear of office.	Gym. opens to dining area. P'rt-'ble stage. Also for civic functions. Windowed lounge overlooks pool.	18' x 44' conf. room, with 1 full glass wall on landscaped court. Room divides.	1400-sq.ft. audit. in office basement. Accordion partition.		Cafet. used as audit. 2 25-cap. conf. rooms with proj. and sound.	2 conf. rooms, 20 people each.		Audit. with stage & proj. rm. Priv. dining rms. Meet'g rms. Eng'ng & reading libr. Landscaped court.
PLANT PROTECTION	**Fencing**	Yard storage fenced in rear.	Perimeter fence.	Around electrical gear only.	None.	Completely around plant.	Complete perimeter fence.	None. Plant is in residential area.	On 3 unprotected sides.	None at present.	Sides & rear fenced. Office is 4th link. Fenced parking.
	Guard shelters	Inside truck dock entrance.	1 at main gate, 1 at receiving.	None	None.	None, exc. for auto. elec. gate, card-actuated.	At main gate, beside indus. rel. bldg.	None.	1, with view of dock, pedestrian tunnel, & exec. garage.	Temporary shelter.	At truck entrance to service area. Parking lot gates to mfg.: part time.
	How staffed	Company guards, ADT signals.	Company guards.	Company guards; 2 ADT burglary beams.	Not staffed. ADT coverage for sprinklers.	Does not apply; plant operates around the clock.	Company guards.	Fire patrol, off-hours.	Outside agency; 24-hr. coverage.	Will be on a contract basis.	Company guards.
	Mobile coverage	None.	Patrol cars for grounds.	None.	None.	None.	Jeep patrol car.	By city police.	None.	None.	Company patrol cars.
	Community coverage	City police.	St.Louis Co.police Mo. state police.	Sheriff's office patrol cars.	Regularly patrolled by police.	None.	County police.	As above.	Police patrol.	Within city limits; police patrol.	City patrol.
FIRE PROTECTION	**General layout** Reservoir or tank	None. 2 ties to city mains: 30" & 12" lines, direct from pump sta. 2200-gpm. avail.	400,000-gal. water-sphere; 2 750,000-gal. ground suction tanks.	2 lagoons, swimming pool, & underground pressure tank.	None.	200,000-gal. conc. tank, with steel pressure tank.	150,000-gal. el. tank.	300,000-gal. ground tank.	None.	100,000-gal. water-sphere, supplied from city system.	500,000-gal. ground storage tank, plus 250,000 gal. in cooling tower basin.
	Perimeter mains	8" perim. loop, with diag. opp. city ties.	Perims. of all major bldgs.; mains to all aux. facil.	Short main with hydrants at front. Hose conns. along expan. rear.	None. Munic. hydr. at entr. drive, & Siamese conn. to fire line. 2nd Siamese conn. at rear.	Loop system of 6" Transite pipe. Hydrants within 200-ft. of all areas.	Network includes lines to each bldg., plus yard hydrants.	Complete loop. Hydrants & hose houses approx. 400 ft. apart.	Complete circuit, with 8 hydrants.	Along permanent north (front) wall.	Around main & aux. bldgs.
	Wet or dry systems	Wet.	Wet.	Wet.	Wet	Wet.	Dry.	Wet, exc. for cooling tower.	Wet.	Wet, & deluge sys. in solv. bldg.	Wet.
	Extent of sprinkler coverage	100%	98%	100% in plant; partial in office.	100%	Does not apply.	Whse., lumb'r shed, g'r'ge, cord st'r'ge.	100%.	192,000-sq.ft. w'h'se only.	100%.	100% except for office.
	Fire pump(s)	None	1 1500-gpm. diesel. 1 1500-gpm. elec. (In fire house part of B.H.)	1000 gpm. elec. in vault beside press. tank. U'ground conduit from sub.	None.	500-gpm. 100 psi. pump next to water tanks.	None.	Diesel & elec. pumps in B.H. Tanks & pumps tie into city mains.	750-gpm. at water-main entr. Elec. with auto. starting.	None.	2 1000-gpm. pumps (1 elec. & 1 diesel). Plus: 100-psi. jockey pump.
	Tie-in with municipal system	2 connections for city pumper	Working tie-in with local vol. fire dept.	No municipal line nearby.	Yes.	Does not apply.	Sole water source is munic. syst.	City fire house on corner of of property.	Yes.	Sprinklers fed directly from city main.	Yes; city system is water source.
	Fire alarm system	ADT sprinkler supervisory & manual alarm.	Flow indicators activate Gamewell system. Fire pull-boxes.	ADT to Bensenville Fire District.	Sprinkler alarm to town F.D. through ADT.	Manual, originating in control room.	Code signals sounded upon phoned alarm.	Auto. sprinkler alarm; autocall fire alarm & watch patrol.	None.	Flow alarms at each sprinkler riser, plus ADT supervisory.	Alarm & control panel system; 24-hr. watch. City tie.
	Fire construction Fire-resistant mat'ls	Steel roof deck, mineral board insulation, fire resist. adhesive.	Virt. 100% fire resist., incl. fire proofing of steel cols. with conc. & plaster.	Virt. 100% fire resist. constr. exc. some office panelling.	All major construction fire proof.	All plant bldgs. built of concr.	Fire-resistant construction.	Virtually 100% fireproof constr. exc. for cooling tower.	Generally fire resistant, exc. for small areas of wood block floor & wood roof.	Nearly 100% fire resist. materials of constr.	Masonry, brick, gypsum, steel, & conc. construction.
	Roof vents	1 per quarter of plant (see below).	Fusible-link vent in each 45' x 45' bay. (Part of summer exhaust fans.)	None.	None.	Does not apply.		Yes, plus exh. fans in paint storage rm. protected by firestats.		Automatic smoke relief ventilators.	Gravity-type roof vents in mfg. bldg.
	Fire walls	Steel fire curtains divide plant into quarters. Firewall betw. office & mfg.	Around special areas only, plus many draft curtains.	None.	Concrete block partitions around paint spray room.	Elec. equip. rooms encl. by cast conc. walls. Oil pump: by conc. block walls.	Around hazardous locations.	2 draft curtains in plant. Plastic-forming room is isolated. Some for lube. room.	Fire curtains across bldg., & around high heat areas. 10 ft. above floor.	One full wall 180' from W. end. One fire curtain 120' from E. end, down to 12' of floor.	12" block wall bet. low bay & perim. area (2/3) & high bay (1/3). Office sep. from plant by 2 wings.
	Fire extinguishers	S.S. water extinguisher per 5000-sq.ft.	All types as directed by fire marshal. Wheeled	Assorted: water, dry powder, CO_2, & fire balls.	Approx. 2 doz. assorted units spotted in plant.	N.F.P.A. recommendations followed through-	Dry type, at strategic locations.	Dry powder & water; columns marked with	Du-gas, Fireloam, 12 40-gal. foamite	87, mostly CO_2, located as per hazard. Rods	Assorted types, plus hoses, spot-

	tinguisher per 5000-sq.ft. CO_2, & foam in special areas.	rected by fire marshal. Wheeled 150-lb. units hi-hazard areas.	dry powder, CO_2, & fire balls.	assorted units spotted in plant & office.	mmendations followed throughout plant: dry, CO_2, soda acid.		Dry powder & water; columns marked with fluor. paint. Some CO_2 & foam.	Du-gas, Fireloam, 12 40-gal. foamite wagons. Fire hoses every 120'. Foamite on quench tanks.	87, mostly CO_2, located as per hazard. Soda acid in office.	Assorted types, plus hoses, spotted in key areas.
Mobile equipment	Wheeled CO_2 & foam units. Hose houses in yard.	Trailer carries full assortment of fire gear. Garaged in B.H.	None.	None.	Two hose carts.	Several hose reels.	2 hand carts.	7 hose wagons outside plant, each with 300' of hose.	None at present.	Fire truck at Protection HQ. Can drive in main aisles.
How staffed	Mtce. brigade until arrival of city F.D. (5 min.).	Full time fire chief & marshals, plus fire brigade.	Fire brigade	5-man squad supplemented by town Fire Dept.	Fire brigade for each of shifts.	Prod. & mtce. crews, plus by vol. companies.	Private fire brigade.	12-man brigade on 1st shift; 6-man, 2nd & 3rd shifts.	Fire brigade per shift.	24-hr. force, with sep. fire watch phone system.
MAINTENANCE FACILITIES										
Central shops										
Location	Uses part of exist. mtce., across street.	Approx. center of mfg.	South central bay of plant.	Service wing next mfg.	Side central.	Behind tank house, near center-line of plant.	Corner of plant next to boiler house.	Center of plant.	Front center of plant, beside boiler room.	Adjoins B.H. & garage bldgs. near NE corner.
Total area (sq.ft.)	5000-sq.ft. share of the total.	30,000	5,600	150	21,650, & 11,200 outside storage.	20,000	13,200	25,000	2400	22,800
Purpose	Major electrical, pipe fitting, sheet-metal, etc. handled by new plant staff, but across street.	To maintain plant facilities. (Maint. supt's. office is adjacent; 1200 sq. ft.)	Provides all normal maintenance functions except major overhaul.	Handles electrical maintenance of specialized machines, plus general plant maintenance.	Virtually complete mtce. protection for 24-hr./7-day operations in non-industrialized vicinity.	Completely equipped for 24-hr. 7-day mtce. needs.	PM of equip., bldgs. & grounds. Close to B.H., mfg., & finishing. Remote from ass'mbly, packaging, & stock.	Complete mtce. of bldgs., machinery, and equipment.	PM and routine maintenance; repairs of all but major nature.	Handles general plant, services, and yard mtce.
Description	Machine rebuilding in exist. tool room. Sub-mtce. area (2400-sq.ft.) handles new plant mtce.	All prin. crafts, incl. carp., pipe, sheetmetal, millwright, elect., machine.	Screen-enclosed; includes tools, benches, spare parts bins, & storage for mtce. equip.	Min. craft equip. on hand; send out for major repairs. Some for grounds upkeep.	8750-sq.ft. mach. shop; 800 elec. shop; 1100 weld. shop; 2200 truck & veh. mtce; 800 oil & tire st'r'ge; 6565 gen.; 660 offices.	Prin. shops: machine; blacksmith; elec.; carp.; pipe; instr.; tool room. Also incl.: lockers; lunchroom; & offices.	Spacious corner has windows on 2 sides. Has mtce. equip. for all but major overhauls. Augmented by machine shop.	Includes electricians, millwrights, machinists, sheet metal, pipefitters and painters.	Contains all major shop tools.	Incl. gen. purpose machine tools, welders, elec. test equip., (oscilloscopes, etc.) optical comparators, precision gaging, etc.
No. of shop men	15 in exist. shop; 10 in new.	250	8	2	27	70	70, including janitors.	52	25	264
Area maint. shops										
Location	None.	Body point shop (mezz. level).	None.	None.	Does not apply	Behind casting bldgs., nr. center.	Does not apply.	Small mtce. facil. in several areas.	See below.	Mach. & elec. mtce.: 18,300-sq.ft. Tool constr. & rep'r: 35,000. Test set mtce.: 3500.
Total areas(sq.ft.)		900				1000				
Purpose		Breakdowns of conveyors, booths, ovens, drains, filters, piping, 2 to 4 men.				Garage: lubrication, washing, & PM on all outdoor & indoor vehicles.			Area mechanics stationed at critical repair areas.	Area shops, as above, near approp. hi-density mfg. op'ns. Also: misc. bench spots with small tools.
Description		Wire enclosed crib with benches and small tools.				Concr. block constr. Gasoline pumps, compressed air, & oil dispensers conveniently located outside garage.				Shops incl.: model makers, tool insp., tool makers, mach. ops., heat tr't'rs., m'ch'n'sts., electronic tech., elec., locksmith, weld., gen. mtce.,
Outstanding labor-saving maint. equip.	Power sweeper, mobile scaffold, portable crane.	Complete electrical test panel for electr. & electronic equip.	Vacuum floor sweeper, floor scrubber, electr. scooter, mechanic's tricycle carts, pow. hi-lift platf'm.	Does not apply.	10-T. elec. crane, floor op. Auto. lube. systems for kiln, mills, feeders. Yard sweeper.		LPG power sweeper for floors & pavem't, tile flr. maintainer, high lift, tractor with farm trailer & access., lub. dispensing carts. 8,000-lb. fork tr., 2,000-lb. elevating-table hand truck, monorails in mtce. & B.H.	Powered fork lift truck & mobile crane truck.	Does not apply	50' reach boom truck, elec. propelled hydr. op. lift platf'm, 2 elec. personnel carts, 3 flr. sweepers, 4 flr. scrubbers.
Maintenance materials handling equip.	Use prod. equip. or borrow from exist. mtce. shop, quickly accessible thru tunnel.	Fork trucks.	Portable pump for cleaning oil sumps. Special trucks for moving tables & chairs.	None	Hoist frames on roofs. Let-down bays inside bldgs. 15-T. crane. 5000-lb. fork truck. 2 winch trucks.	Crane in each of twin work bays. Fork lift trucks.			None within dept. at present. Uses contract riggers for installation of or removal of heavy equipment	20,000-lb. & 5000-lb. hydr. lifts for trk. mtce.; 6000-lb. elec. crane tr.; with plow & sander; fr.-end loader.
Battery charging	6 MG sets.	Rectifiers & MG chargers for assorted fleet of elec. & engine-driven material handling vehicles.	1 6-v. 1 12-v. 1 24-v.	None	Trickle chargers.		R'ct'f'er for small lift trucks, floor maintainer, & emergency lights. (All heavy veh. are LPG)	44 units at 3 stations. Incl. MG & r'ct'f'rs up to 20-kw. (260-kw. total charging cap.)	2 M-G chargers handle 8 batteries.	18 MG sets: 30-v., 350 to 750-amp. hr. cap.; 1 MG set: 24-v., 700-amp.hr.; 21 selen. r'ct'f'rs; 12-v., 300-amp.hr. Also: steam clean equip.

FACTORY

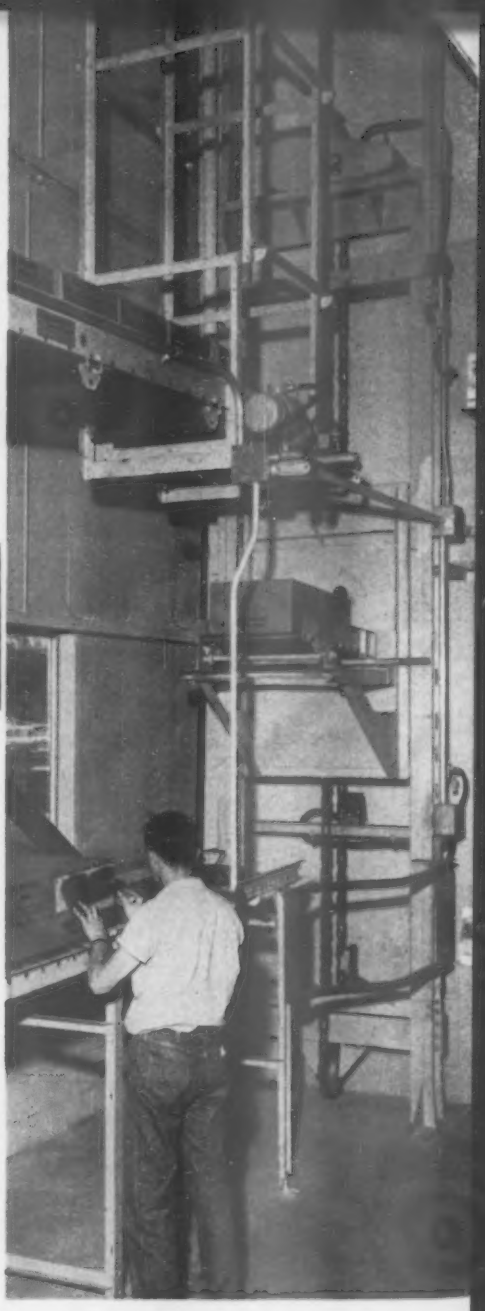


Top Plants of 1960

Excellence at Work Today

In day-to-day plant operations, as in initial design, the Top Ten plants prove the efficiency of their management teams. The features that follow explore their operating techniques, and will round out your picture of the plants. You'll find these features full of helpful information on plant operations. And two of them will aid you in the infrequent—but highly critical—job of plant site selection.

Turn the page



ROYAL McBEE INSTALLED THIS VERTICAL CONVEYOR AFTER THE NEW PLANT WAS OPERATING. FIRST METHOD WAS TO TRUCK CARTONS FROM INCOMING (FROM PACKAGING) CONVEYOR TO STENCILING OPERATION. NOW CARTONS COME FROM PACKAGING ON UPPER CONVEYOR, RIDE VERTICAL CONVEYOR DOWN TO STENCILING STATION, THEN RIDE A ROLLER CONVEYOR TO STOCK. ELECTRIC EYE ON ROLLER CONVEYOR HOLDS CARTONS ON UPPER CONVEYOR WHEN LOWER ONE IS FULL. ELECTRIC COUNTER ON UPPER CONVEYOR TALLIES PRODUCTION.

Improvements in operations — like the conveyor in the photo — come from cost control methods and cost improvement sources summarized in the chart at far right.

TOP PLANTS OF 1960

COST CONTROL—

The new plants fight hard to keep the competitive edge they've gained

Analyze the center column of the chart opposite and you'll find that every one of the Ten Top plants has some system for controlling costs. One method is used more often than any other. That's the standard cost system, with monthly operating budgets based on standards for expense items. Six of the top plants use this method. Three more plants use flexible budgetary control without standard product costing.

Only one of the plants, Flick-Reedy, relies entirely on an actual cost reporting system. But Flick-Reedy has added some special features to its system that create good cost-consciousness and good control. Here are the features:

- Employees are all paid a monthly bonus, based on company earnings of the previous month. This profit-sharing plan gives employees and managers a reason for keeping costs down. The bonus is paid on the 15th day of each month. It amounts to one-half of the percentage of the previous month's profit, applied to each employee's monthly gross pay.
- Each cost account is recorded graphically, so that long- and short-term trends can be easily understood. The charts are updated monthly, and are maintained for a full 48 months.
- Each purchased part is recorded on an individual record card. Prices are clearly shown.
- Performance of production operators is reported daily, weekly, and monthly.

HOW THE TOP TEN CONTROL AND IMPROVE COSTS

Company	Cost Control Methods	Cost Improvement Sources
THE BRUNSWICK-BALKE-COLLENDER COMPANY	Standard costs and flexible budgetary control	Annual objectives for all departments Monthly review of cost variances
CHRYSLER CORPORATION	Budgetary control	Special committees
FLICK-REEDY CORPORATION	Actual costs plus 48 months of historical costs	Production engineering
G-V CONTROLS, INC.	Standard costs; direct costing	Methods department
IDEAL CEMENT COMPANY	Standard costs	Technical attention to high costs
KENNECOTT REFINING CORPORATION	Flexible budgetary control	Suggestion system Methods improvement program
ROYAL McBEE CORPORATION	Standard costs and flexible budgetary control	Production engineering Methods and improvements committee
SCREW AND BOLT CORPORATION OF AMERICA	Flexible budgetary control and actual costs	Cost reduction committee Analysis of budget variances
THE SPRINGDAY COMPANY	Standard costs and flexible budgetary control	Cost reduction committee New machine design and development committee Utilization cost reduction by plant engineer Work simplification by industrial engineering Suggestion system
WESTERN ELECTRIC COMPANY, INC.	Standard costs	Cost reduction committee Cost reduction program by engineer of manufacture Clerical cost reduction by business methods organization Suggestion system

• Reject reports are signed by responsible operators and foremen. And all errors are compiled into a monthly quality report which shows cost of rejects by part number and materials group.

THE NEW PLANTS USE ACTION REPORTS

Historical summary reports of cost performance accurately show results of management efforts during an operating period, but only after the end of the period. These cost reports show actual costs of making the products. The actual costs are compared with sales prices, past records of costs—even with competitors' prices or costs. However, they respresent history—how good or bad the plant was *last* month, last quarter, or whatever the frequency of the report.

To help make the historical cost reports look better, many of the Top Ten plants use quick-reaction reports. These reports are issued at short intervals—weekly, daily, sometimes even more often. They cover very recent results—those of the previous day, for example. But they're limited to data that have heavy impact on over-all costs, such as direct labor performance or reject percentage. The data may be less accurate than those in the monthly cost reports, but speed takes preference over accounting accuracy in these fast-action reports.

The most popular action reports used by the Top Ten are daily reports of production, operator performance

Plant operating managers can't relax—even in Utopia. The new plants, already producing at savings as high as 33% over the old plants, will find some of their manufacturing techniques obsolete in another year.

against standards, and quality performance; and weekly reports of labor performance, indirect labor hours, overtime hours, and production schedule performance. The reports are tailored to each plant's elements of cost that are subject to daily or weekly fluctuation.

THE NEW PLANTS SET TIGHT BUDGETS

Is it possible to set up a reasonably accurate budget for a brand-new plant? Yes, say all the plants that use budgets. (Nine of the Top Ten use budgetary controls. Only Flick-Reedy does not.)

Each of the nine plants used its old-plant cost experience as a base. Those with comparable plants within the company also used data from the other plants. Budget standards were adjusted for new methods and equipment. Estimates were used in cases where engineering data weren't readily available.

All plants report they started up with tight budget standards. But none have performed major loosening revisions. Instead, they're trying to get the new plants up to budget expectations. Several say they're already at 100%, and expect to tighten standards even more when revision time comes around.

THE NEW PLANTS PUSH COST REDUCTION

Generally, a new plant is the last word in low-cost methods and equipment. But—as proof that management can't relax even in Utopia—every one of the Top Ten plants works hard at cost reduction.

Three plants have suggestion systems to handle nonmanagement employee ideas for improving costs. Most plants have an active engineering organization working on cost-cutting ideas.

The plant with the most extensive cost reduction program is Springday. Here are the company's five cost reduction tools:

1. A cost reduction committee of department managers meets monthly to act on improvement ideas.
2. A new machine design and development committee—made up of production and engineering representatives—processes short- and long-range plans for new production methods and techniques.
3. A utilization cost reduction effort squeezes out excess costs by keeping operating expenses aligned with production volume. The plant engineer is responsible for meeting savings goals.
4. A work simplification program, run by industrial engineering, cuts costs with better methods and improved plant layout. Monthly reports show status of each project, savings for completed projects.
5. A suggestion system pays employees extra money in proportion to savings generated by their ideas.

Western Electric's plant also has a rounded cost reduction program. It's unique among the Top Ten for its business methods organization that concentrates on clerical costs.

Brunswick-Balke-Collender uses departmental annual objectives to force cost improvement. The company includes price review of purchased materials and parts in its cost reduction program.

One plant cites its $80,000 savings in 1959 as a good reason for starting a cost reduction program when the new plant starts operating. That's a sound enough reason for anybody.

THE NEW PLANTS GENERATE SAVINGS

There are two elements of cost reduction in the first year of operation of a new plant. First, there's improvement of cost over the old plant. Generally, that's substantial. Only one plant provided an estimate of this kind of saving—a whopping 33%. That means this new plant is operating during its first year at product costs equal to two-thirds of product costs in its old plant. Second source of first-year cost reduction is improvement in operating methods and practices over those originally set up in the new plant. Generally, the second source produces less dollar savings than the first during the first year of operation.

Top Ten plant managements expect substantial cost improvements during the second and third years, too. The average of second-year savings is roughly 10 to 15% over total first-year costs. Cost reductions expected for the third and subsequent years are less: 5 to 10% savings over total second-year costs.

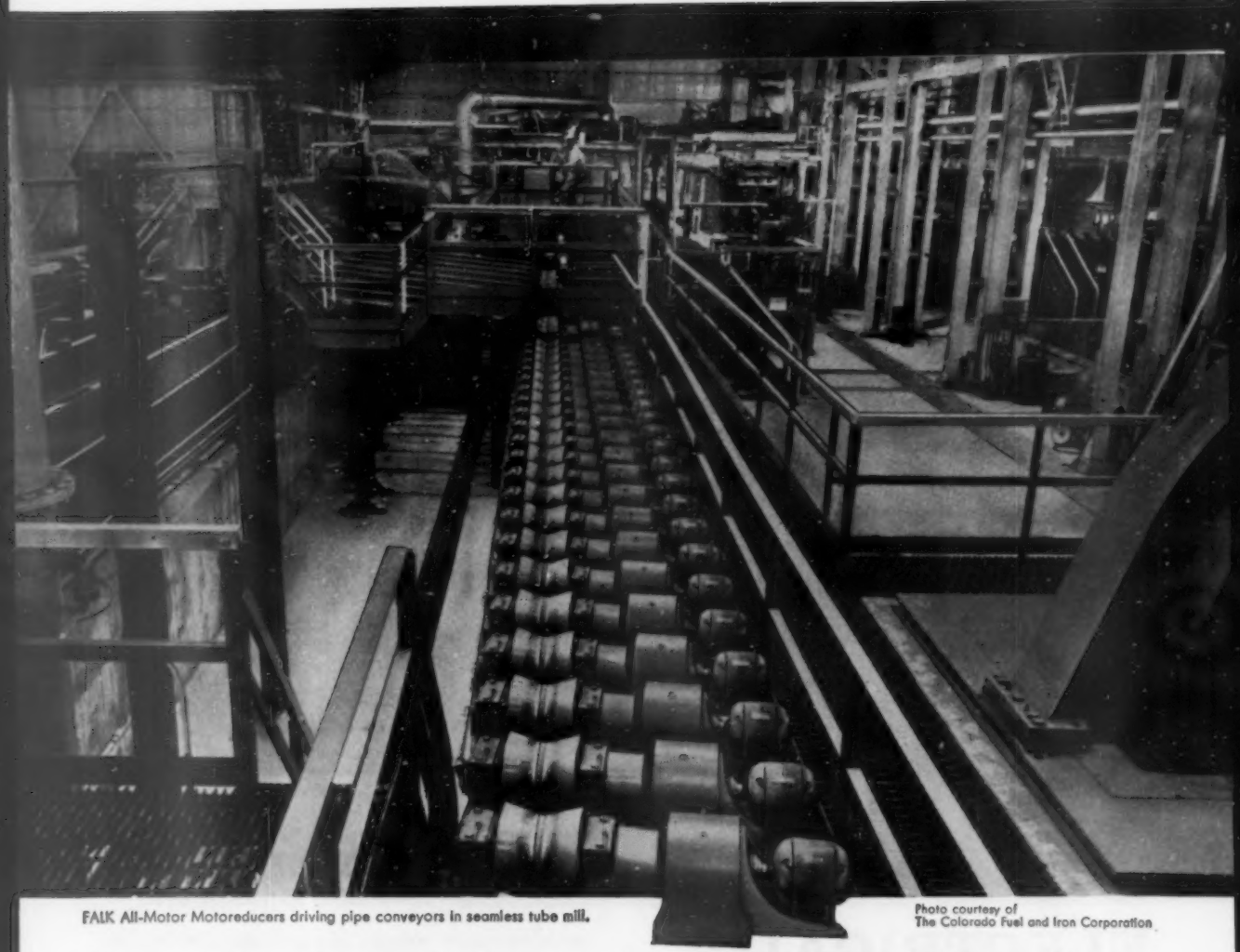
Three plants expect second-year savings to exceed the first. One has had to smooth out some rough production kinks it encountered during the first year. Another expects to increase its cost reduction effort next year, and get higher savings.

THE NEW PLANTS NEED UPDATING

Methods and equipment in these new plants will soon be obsolete. That's what managers of most of the Top Ten plants think.

First-year savings over the old plant reflect reductions in nearly all cost elements. Further reductions in cost during the first year come from improvements in employee and machine performance—smoothing out the rough spots in production, maintenance, and clerical methods and procedures.

But, immediately thereafter, cost reduction emphasis is expected to shift to new techniques, machines, tools, materials, and product design. Managers of some of these plants go so far as to say the manufacturing techniques in a new plant are good for only one year without some change.



FALK All-Motor Motoreducers driving pipe conveyors in seamless tube mill.

Photo courtesy of
The Colorado Fuel and Iron Corporation

You get these "extras" when you buy FALK *all-steel* Motoreducers

1. **Freedom from damaged housings.** The exclusive FALK *all-steel* construction gives full protection from cracked housings or torn-off feet...plus twice the ability of cast iron to maintain vital alignment.
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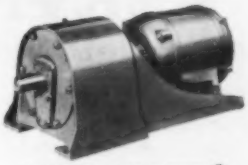

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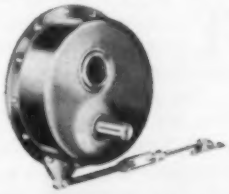

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ELECTRICAL SERVICES—

In '60 The Top Plants Plan for Growth

The winners of 1960's Top Plants competition met a wide range of system design problems. And they met them well—ingeniously in some cases.

The systems range in size from small to huge (300 kva. for compact G-V Controls to 38,750 kva. for powerful Kennecott). They range also from simple to complex—as complex as Western Electric's primary selective, secondary interconnected network.

Throughout, there's a definite trend to more future planning than was the case even a few years ago. The engineers clearly expect vigorous electrical growth.

In addition to the analysis of the Top Ten's electrical ideas on these four pages, you'll find a whale of a lot of helpful information on their electrical systems in the pull-out section starting on page 133.

WHAT'S NEW IN INCOMING VOLTAGES?

Incoming supply voltages of plants are climbing. It wasn't many years ago when 13.2 kv. was considered big stuff for an industrial plant. This year seven of the Top Ten are fed at 13.2 kv. or higher. And most of these plants are not really big power users. For instance, the Springday facility has a main transformer capacity of 5000 kva., yet it's fed at 69 kv. (There are hundreds of plants with that load still being fed at 2300 volts—or even lower.)

With these higher voltages come better power rates, more economy in voltage regulation (if needed), and the need for more high-voltage maintenance competence. There's no let-up in sight for this trend.

In addition to higher voltages, there's evidence of increasing emphasis on dual supplies. Five of the 1960 Top Ten have dual feeders installed. Three more plan to install them.

Emergency standby power equipment isn't dropped when dual feeds are available. Five plants have gasoline or diesel generators, two of these in plants with dual supplies. Alternate incoming feeders help but don't guarantee continuity.

Springday (which faced a problem germane to companies moving into rural areas) is fed from two different utilities—the Southern Power Administration and the local municipal utility. But both of these are low-capacity lines. The instantaneous overload relays on Springday's incoming breaker are set unusually low in order that any load unbalance caused by phase-to-phase faults anywhere on the utility lines will trip the breakers before plant motors or equipment can suffer any damage.

Effective use of light makes a nighttime showplace of Chrysler's new car check-out building (photo at left). And employees have the light they need to do their work efficiently.

Continuity of power is one problem management at Western Electric's plant won't have to worry about. Typical double-ended load center substation (one of 18), at right of photo, can be switched to either of two alternate primary feeders. Other high-voltage switches on the left feed through power to adjacent substation. Panel before standing operator has minimum number of meters, yet enables him to check load and voltages on all secondary feeders and motors.

STRETCHING ELECTRICAL DOLLARS

How much of a factor were power costs in the decisions of the Top Ten plants to locate where they did? Four of the winners said that power costs in their areas are "reasonable—an added incentive to locate here." Three pointed out that "power cost is too small to be a determining factor." The other three said "high—but other factors outweighed the disadvantage." It could be misleading to draw any inferences from such a small sampling. But one thing is clear. When plant managements *think* power costs are high, they're going to watch power waste far more carefully—and they will be more reluctant to convert manufacturing processes to all-electric operation.

Peak demand charges aren't going to penalize many of the winning plants. Most of them have taken steps right from the beginning to prevent unnecessary peaks from occurring. Most interesting of all are the measures taken by Flick-Reedy's "all-electric" plant. Most of the water heating for process and personnel use is heated at night and stored. One 50-kw. section of the 150-kw. heater provides daytime make-up heat. Night off-peak water heating is done in this sequence: process, domestic, swimming pool.

Kennecott's main switchboard includes a demand limit alarm system that enables it to drop some load (electro-chemical loads can "coast") to avoid penalties. Screw and Bolt Corporation expects to stagger starting of large motors. Western Electric follows a maintenance program on control equipment to keep peak loads from running longer than necessary.

Power factor (pf) improvement measures are included in seven plants. Correction is being installed more and more, even where there's no utility penalty involved—a sign that plant management is finding it pays to go after the extra electrical capacity of high pf operation. Five of the Top Ten use leading pf synchronous motors and three use capacitors. Chrysler is installing pf capacitors on all motors 25 hp. and larger. Springday uses induction motors with capacitors for their main compressor drives, although the main mill drives use synchronous motors. One of the biggest economy-oriented capacitor layouts is at Screw and Bolt Corporation's main substation. Here a 3000-kvar. bank of 25.7-kv. capacitors is switched in as pf drops.

Springday uses another idea that's beginning to catch on—outdoor metal-clad primary switchgear with enclosed aisle. Of like interest is the indoor-outdoor arrangement at Flick-Reedy. With this set-up, the plant is able to reap the advantages of both inside and outside equipment.

Flick-Reedy's six-cubicle line-up of gear is mounted in the plant's concrete block outside wall adjacent to the transformer. Front face of the gear is flush with the inside wall. The rear projects outdoors. All door

High-voltage motors are coming into increasing use because of inherent reliability of primary systems. Springday controls all five 4160-volt main mill drives (200 to 500 hp.) from this line-up of fused motor starters. Motor-generator sets for synchronous motor d-c supply is controlled from panel at right. Plant gets maximum flexibility and economy in high-voltage distribution using interlocked armored 5-kv. cable in trays that are suspended from the ceiling.

and panel surfaces exposed to the outdoors are lined with thermal insulation and the door joints gasketed. A flashed, sloping roof diverts water and a small strip heater prevents condensation.

HOW THEY PLAN SPARE CAPACITY

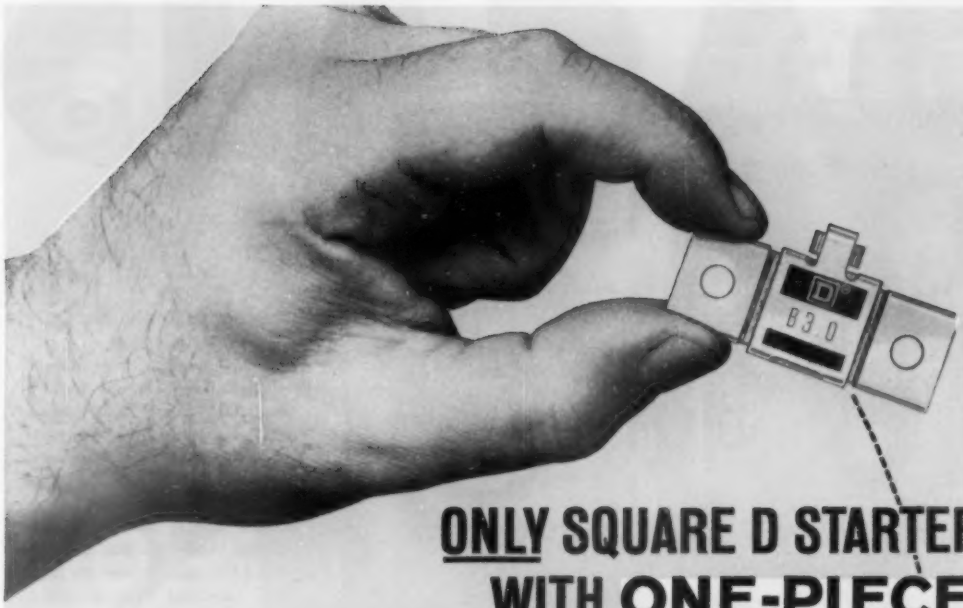
Managements at every one of the Top Ten plants *expect* substantial electrical growth—considerably greater than the capacity of today's typical plant. And they have *planned* flexibility so changes can be made easily and economically. All show evidence of good planning in terms of putting spare capacity where it would be needed first—and where it would be more expensive to buy later. Often this meant providing more flexibility in the primary system (where added load units would be large or where the plant *area* was expected to increase). In other cases designers planned for load density growth by installing an oversize, primary distribution system; leaving ducts to pull in new cables; keeping load center substation panel space open for secondary breakers that might be needed in the future.

HOW THEY CHECK OVERLOADS

There's growing evidence that more new plants are making plans right from the start to watch electrical loads so that motors, ovens, and lights are fed at proper voltage levels (higher efficiencies, longer motor life, faster starting) and new loads can be added where demand is lowest. Springday already has ammeters on each feeder to check loads daily. Later, plans include installation of recording instruments to determine which departments are causing peak demands if daily surveys fail to turn up the source. Western Electric plans weekly load surveys.

HANDLING PROBLEM LOADS

At Chrysler a typical problem load generated by a main welding station was solved by isolating the operation and feeding it from two double-ended substations using 1600-amp. low reactance bus. Another idea that Chrysler designers used also has wide application. The plant's eight production load center substations are sym-



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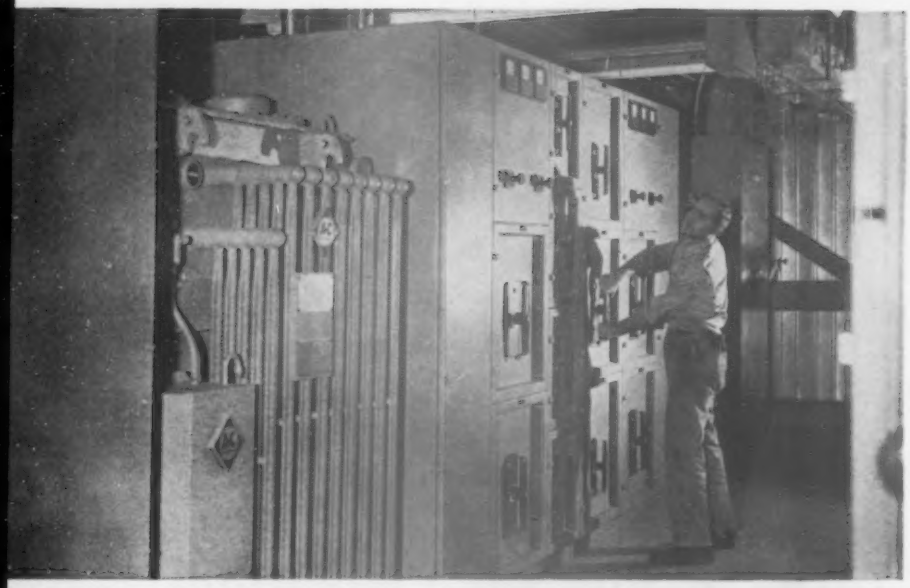

Primary loop here can handle production changes and growth without rebuilding electrical system at Screw and Bolt's plant. Loop feeds this and seven other mezzanine-mounted load center substations. It has enough built-in capacity to handle as much as a 5000-kva. increase. And each load center has 25% reserve capacity for any localized load growth.

metrically spaced in two rows and roof-mounted. Long rows of continuous secondary bus duct parallel these rows. Isolator sections in the duct between adjacent substations are shifted to keep substation loads balanced. Buried cables cannot interfere with conveyor line or production flow changes.

To cut maintenance downtime and reduce its spare parts inventories, Ideal Cement has worked out a standard motor control circuit for all motors. Starter and component wiring specifications were created to match the design.

Only two plants among the winners this year have an ungrounded secondary distribution system—Flick-Reedy and Chrysler. Seven of the Top Ten distribute secondary power at 480/277 volts (grounded). G-V Controls, because of its small loads, distributes power through a 208/120-volt system (grounded).

Flick-Reedy and its utility, Commonwealth Edison, have teamed up to get complete records of power usage at their heat pump installation—the plant's key load. It expects to come up with data that will be of great help to others who are evaluating the building of "all-electric" plants.

LIGHT LEVEL AVERAGES JUMP

Lighting levels have moved up substantially again this year. Production area lighting for all plants in the competition (only those submitting accurate illumination data are included) averages 57 foot-candles. (Last year's winners averaged 50 ft.c.) The figure for the Top Ten is actually slightly less—55 ft.c. But this comparison can be misleading. Proper perspective is gained if you analyze figures in terms of "percent of standard levels." For example: the average competing plant illuminated its production area at 67% of IES standards for their typical seeing tasks. The Top Ten averaged 79%.

Office lighting among the winners took an even bigger jump than the 10% foot-candle gain in production area lighting. Office workers in the 1960 Top Ten plants will work in an average 76 ft.c. of light. And both main and production offices are lighted at about the same levels. A year ago the figure for winning plants was 63 ft.c. All contestants averaged 78% of IES standards for office lighting in 1960. Last year's all-inclusive comparable figure was 72%. This kind of a gain shows that, in spite of far greater cost-consciousness, more money is going into better employee lighting. Conclusion: Plant management is finding it doesn't pay to pinch on employee lighting.

This year's interesting lighting installations included smart ways to handle future increases in lighting levels. G-V Controls uses trolley duct for hanging and supplying power fixtures. G-V can vary levels from 65 to 150 ft.c. by just moving or adding fixtures. Lighting circuits at Chrysler's plant are equipped to supply 60% more future light. The big auto plant speeds parking-lot lamp changing through the use of pole top lights which can be disassembled and lowered by cable to the ground for cleaning and relamping. For operator comfort, fluorescent lighting level in Ideal's control room can be varied from 0 to 50 ft.c.

Installing good lighting is only part of the job. How are today's best plants planning to keep the lighting at top level performance?

Six of the Top Ten have plans for group lamp replacement. Royal McBee expects to take monthly readings of light levels, as a guide to both cleaning and maintenance scheduling. Only two plants definitely plan to change lamps on an "as needed" basis. Five have schedules for periodic cleaning and washing.

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TOP PLANTS OF 1960

MATERIAL HANDLING—

Basic Concepts Prove Key to Advanced Methods

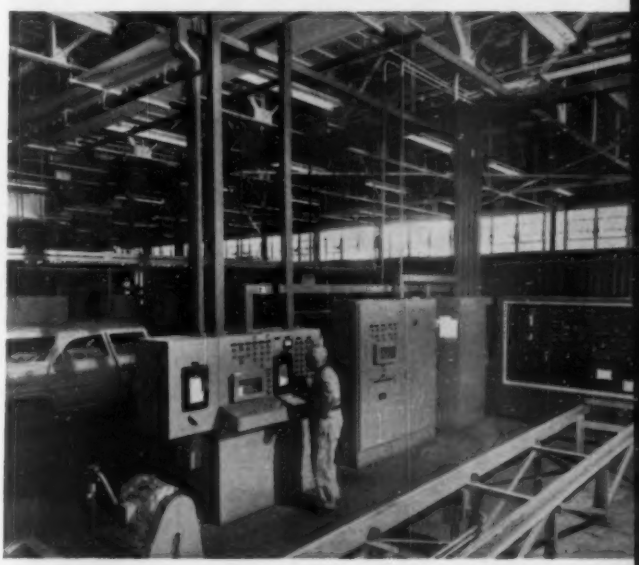
POWERED CONVEYORS and skate-wheel, inclined live-storage racks provide maximum warehousing efficiency with minimum personnel at Springday's rubber products plant. Conveyors quickly carry away packages selected by order picker from racks. Two men can fill an order—one selects packages, one stacks conveyor-delivered containers inside the waiting trailer truck.

Drawing from a solid portfolio of equipment and time-tested basic concepts, the 1960 Top Ten Plants have come up with a score of material-handling techniques—to suit their industries and spawn inventions in yours.

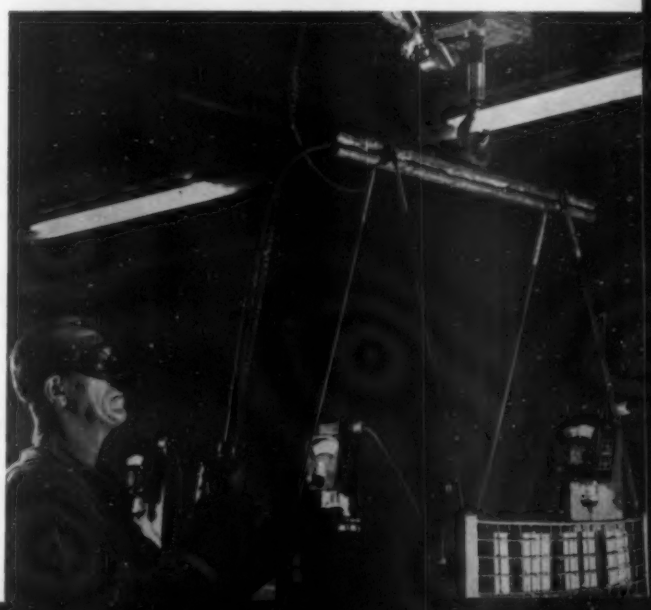
In some cases the solutions to a sticky problem were not obvious. But the need to cut costs and improve operations overruled any hesitations over the need to act.

Here then, for *your* portfolio, is a four-page review of ideas applied to a multitude of handling situations by the 1960 Top Ten.

HIGH-LIFT TRUCKS, handled with crafty precision, provide vital, temporary storage space at Brunswick-Balke-Collender. Unfinished top level of two-story office area won't be used until expansion calls for extra personnel. Meanwhile, that floor is being used for storage. Wide doors (at rear of office floor) open out to the high-ceilinged factory area. Fork-lift trucks drop off their cargoes as if from an ordinary mezzanine.



ELECTRO-MECHANICAL CONVEYOR provides scheduling flexibility on auto-body paint line at Chrysler's assembly plant. Here operator checks intricate control console and indicator board which routes car bodies through spraying booths. Conveyor is like a small railroad switchyard. Car bodies, on castered trucks, are moved to booths or held on side tracks. Lights warn of any unscheduled stoppage or trouble.



HYDRAULIC CYLINDERS from its product line give Flick-Reedy chance to handle material more cheaply and to explore new applications at same time. Here, operator uses cylinder-lift hook arrangement to raise and lower cylinder blocks in and out of plating bath.

Turn the page

MOLDED PLASTIC TRAYS provide easy, neat handling for this year's smallest product at this year's smallest plant. G-V Controls uses the trays to hold and move lightweight electrical relays from one work spot to next. Trays nest when empty, yet stack firmly when every other tray in pile is turned 180 degrees. Each tray cavity holds one relay, thus affording built-in protection for the tiny parts, and built-in counting as well

ELECTRO-MECHANIZED CONVEYOR system daily transforms 1200 tons of raw materials into 3500 barrels of high-grade portland cement with no handwork at Ideal Cement's desert plant. To move even bagged cement requires only a bare touch of the hand. Each filled sack zips from an automatic bag packer and shoots down a packer conveyor to a waiting truck. In this photo you see a 292-ft.-long primary belt conveyor that carries up to 720 tons of crushed limestone per hour direct from the crusher to the raw storage area

HUGE STRADDLE TRUCKS at Kennecott Refining's new facility signal a breakaway from the narrow gage railway used in older plants. Resembling those used in many lumber yards, these trucks haul raw copper from step to step in the refining process. At one stage of the process, special racks holding 25 tons of copper are picked up by one truck and moved nimbly to the next stage in a fraction of the time required for comparative ore car operations. Trucks are easier to maintain than the old-type rolling stock and tracks.

Turn the page

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Built-In Overload Protection for Operator, Load and Hoist with the New Wright Overload Cutoff*!

• Now, for the first time on any electric hoist, you can have safe, sure mechanical overload protection as a built-in feature with the **WRIGHT Overload Cutoff.** Designed and built to fit any new WRIGHT *Speedway* Electric Hoist, the Overload Cutoff unit you see pictured above is a compact, integral part of the hoist frame itself. As a result, it becomes a functional part of the hoist *at no sacrifice in headroom.* The WRIGHT Overload Cutoff is simple in design and should give dependable, trouble-free operation during the entire life of the hoist under normal operating conditions. Calibrated and sealed at the factory for the user's protection, the unit takes rugged abuse up to the critical point of overload—then instantaneously "breaks" the raising circuit of the hoist. This allows the load to be safely lowered to the floor and unhooked. Once this is done, the raising circuit of the hoist is again automatically restored.

The WRIGHT Overload Cutoff is available now as standard equipment on all new WRIGHT Frame 2 & 3 *Speedway* Electric Hoists, and as optional equipment on new Frame 1 & 1½ models.

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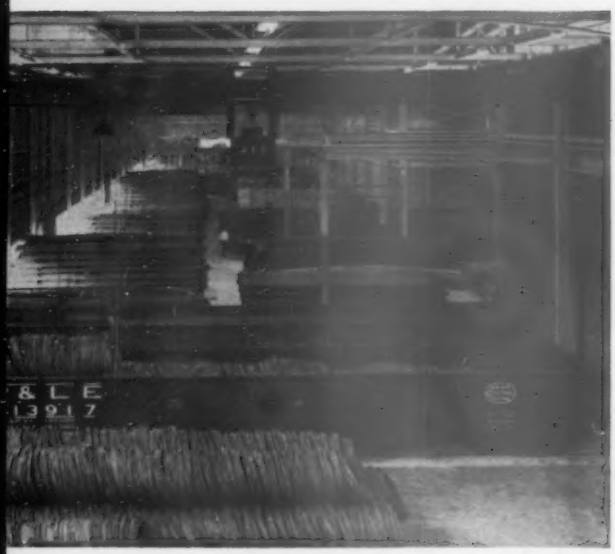
TOTE BOX CONVEYORS help give Royal McBee maximum control—with minimum handling—of 1700 parts that make up each portable typewriter passing through the plant. Steel boxes follow through each machining and fabricating operation, pick up parts as they go. Boxes move along the conveyor system that is partly overhead and partly at floor level. Boxes are weigh-counted, dispatched by pin-indicators to their next destination and finally emptied at the stockroom.



PASS-THROUGH RAIL SPUR makes unloading operations easy at Screw and Bolt Corporation's new Pittsburgh area plant. Incoming rails divide into two lines, then enter rear wing of plant. Both lines pass straight through and outdoors again into storage and scrap yard. Two gondola cars, one on each track, can be unloaded indoors with doors closed, thus affording maximum operator comfort. Trackmobile quickly spots new cars into unloading position as first ones empty their loads.

OVERHEAD MONORAIL CONVEYORS (enclosed wheel style) handle lightweight parts during subassembly operations. When subassemblies converge at final assembly areas, they again take to the air. Heavy "crossbar frames" hang from an elaborate overhead railroad system as they progress through wiring, testing, and shipping operations. The monorail conveyor system is complete with spurs, right and left switches, and crossovers.

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Bright, cheery cafeteria at Flick-Reedy seats 240, lets workers enjoy soft music and view of a nearby airport.

TOP PLANTS OF 1960

EATING FACILITIES—

Thousands Dine in Minutes

A lot of sound planning went into the on-premises eating facilities of the Top Ten plants. Seven of the plants boast complete cafeterias (some have several), the majority of them with added features such as piped music, outdoor eating on balmy days, and large window areas overlooking a pleasant landscape. A few of the plants provide bakeries and adjacent recreation areas as further bonuses.

The company role, normally handed to the personnel or industrial relations department, is more or less hands-off supervision. In most of the Top Ten plants, the company has a hand in setting the prices to be charged and keeps tabs on the variety and quality of the food offered its employees.

VENDING STRETCHES TIME

The trend to vend (FACTORY, January 1956, page 92) is continuing, judging from the fact that nine of the Top Ten plants have vending facilities. The exception: Ideal Cement, where no eating whatever can be allowed in the plant, and where nearly all employees bring their lunches. At Ideal, both office and plant workers eat in an attractive dining area in the office wing.

In most cases, part of the vending profit is turned over to the company, usually to an employee fund. One plant uses the cash to defray part of its cafeteria deficit. But every one of the Top Ten that accepts money from the concessionaire is using it for the direct benefit of its employees.

Almost all the plants report they are well satisfied with their vending concessionaires. Opinions of the service (given by the managers responsible for in-plant feeding) ranged from "fair" to "excellent."

Another angle to this trend that was spotted in the 1956 FACTORY article seems to be borne out by the practices of this year's Top Ten. The half-hour lunch period is getting more and more common, for both shop and office people (see table, facing page). Improved vending machines are probably a large factor here. They permit fast, convenient feeding of large numbers of people, and eliminate the headaches of swing-shift feeding, elaborate custodial services, and bottlenecks at the checkout counter. Vending also automatically separates the lunch-carrier, who wants only a beverage and an ice-cream bar, from the stout bachelor who wants soup, rolls, a hot dish, apple pie, and coffee. No one loses time waiting in line for items that aren't wanted. Biggest objections to vending: It's too impersonal, and the food lacks variety.

ATMOSPHERE STRETCHES APPETITES

In each of the Top Ten plants, specific areas are set off for eating purposes. Managements have applied imagination and good taste to making these areas pleasant, quiet, clean, and dignified. Six plants have terraces for outdoor dining in good weather. Brunswick-Balke-Collender has even provided shuffleboard and (appropriately) billiard facilities for lunch-period recreation. Flick-Reedy, too, offers shuffleboard and Ping-pong equipment in the recreation area next to its cheery cafeteria (photo above).

Picture windows, and even floor-to-ceiling window walls, are the cry in six of the Top Ten. In each case,

1960's Top Ten Approach To In-Plant Feeding

GENERAL	BRUNSWICK-BALKE COLLENDER	CHRYSLER	FLICK-REEDY	GV CONTROLS	IDEAL CEMENT	KENNECOTT	ROYAL McBEE	SCREW & BOLT	SPRINGDAY	WESTERN ELECTRIC
Product	Pin Setters	Autos	Hydraulic Cylinders	Relays, Electronic	Cement	Refined Copper	Port. Typewriters	Screws & Bolts	V-Belts	Tele. Sw. Gear Eqpmt.
Headquarters Plant?	NO	NO	YES	YES	NO	NO	NO	YES	NO	NO
Plant Employees	450	4025	218	100	75	456	1000	540	352	1700
Office Employees	150	575	107	60	25	114	100	134	48	500
Employees Who Carry Lunch	75%	50%	10%	25%	±90%	90%	25%	25%	25%	15%
Plant Lunch Period (Minutes)	30	30	30	30	NA	20	30	30	30	30
Office Lunch Period (Minutes)	45	45	30	30	NA	45	60	30	30	45
Nearest Restaurant	CLOSE	½ MILE	1 MILE	1 MILE	5 MILES	3 MILES	1 MILE	2 MILES	3 MILES	2 MILES
CAFETERIA FACILITIES								NA — information not available		
At least one Cafeteria?	YES	YES	YES	YES	NO	NO	YES	YES	NO	YES
Operation Contracted?	YES	YES	YES	YES	——	——	YES	YES	——	YES
Plant Opinion of Service	VERY GOOD	GOOD	GOOD	GOOD	——	——	EXC.	VERY GOOD	——	GOOD
Average Time Per Service	5 MIN.	5 MIN.	2 MIN.	5 MIN.	——	——	5 MIN.	2 MIN.	——	4 MIN.
Multiple Check-out Stations?	NO	YES	NO	NO	——	——	YES	NO	——	YES
VENDING FACILITIES										
Some Income Returned for Employee Benefit?	YES	NO	YES	YES	——	NO	NO	YES	YES	YES
Hot Dishes Available?	NO	NO	NO	NO	NO	YES	NO	NO	YES	NO
Cold Dishes Available?	NO	NO	NO	NO	NO	YES	YES	NO	YES	NO
Hot Drinks Available?	YES	NO	NO	NO	NO	YES	YES	NO	YES	NO
Cold Drinks Available	YES	YES	YES	NO	NO	YES	YES	NO	YES	NO
Cigarettes Available?	YES	YES	YES	YES	NO	YES	YES	YES	YES	YES
Candy Available?	YES	YES	YES	YES	NO	YES	YES	LATER	YES	NO
SPECIAL DINING FEATURES										
Music During Meal?	NO	YES	YES	YES	NO	NO	NO	NO	NO	YES
View of Pleasant Landscape?	NO	NO	YES	YES	YES	NO	YES	YES	NO	YES
Outside Dining Patio?	NO	NO	YES	YES	NO	NO	YES	YES	NO	YES

CHECKLIST **of features shows what the Top Ten offer in their employee eating areas. Emphasis is on sanitation, atmosphere.**

the windows command a restful view. At G-V Controls, it's a wooded park, complete with a stream. At Flick-Reedy, it's graceful airliners landing at neighboring O'Hare Field. Ideal Cement looks out on a low mountain range. Royal-McBee and Screw and Bolt have multiple glass walls overlooking handsome lawns.

With the variety of installations offered by this year's winners, it's easy to select features that might be applicable to your own plant (see next page). But two general tips seem to be in order.

First, check the Wallach Research Study (FACTORY, August 1958, page 105) for an employee's eye view of major improvements available at minimum cost.

Second, if you're planning to modify your present set-up or to install a new one, take a tip from the Top Ten—contact a number of caterers in advance, select one, and let him in on your planning sessions early. His specialized knowledge might save you a lot of grief and help assure a satisfactory operation.

Turn the page

Restaurant Rivals

In-plant cafeterias of the Top Ten reflect the acceptance of employee morale as an integral part of a really modern plant. Since good food served in attractive surroundings is one of the best morale builders known, the Top Ten plants boast cafeterias that rival some expensive restaurants.

Consider, for example, some of the features at **Royal McBee's excellent facility (top photo):** a receiving platform next to the cafeteria, three walk-in refrigerators, two walk-in freezers, two dry storage rooms, lots of stainless steel equipment. And to keep traffic moving crisply, there are multiple check-outs and a conveyor belt that assists in dish collection.

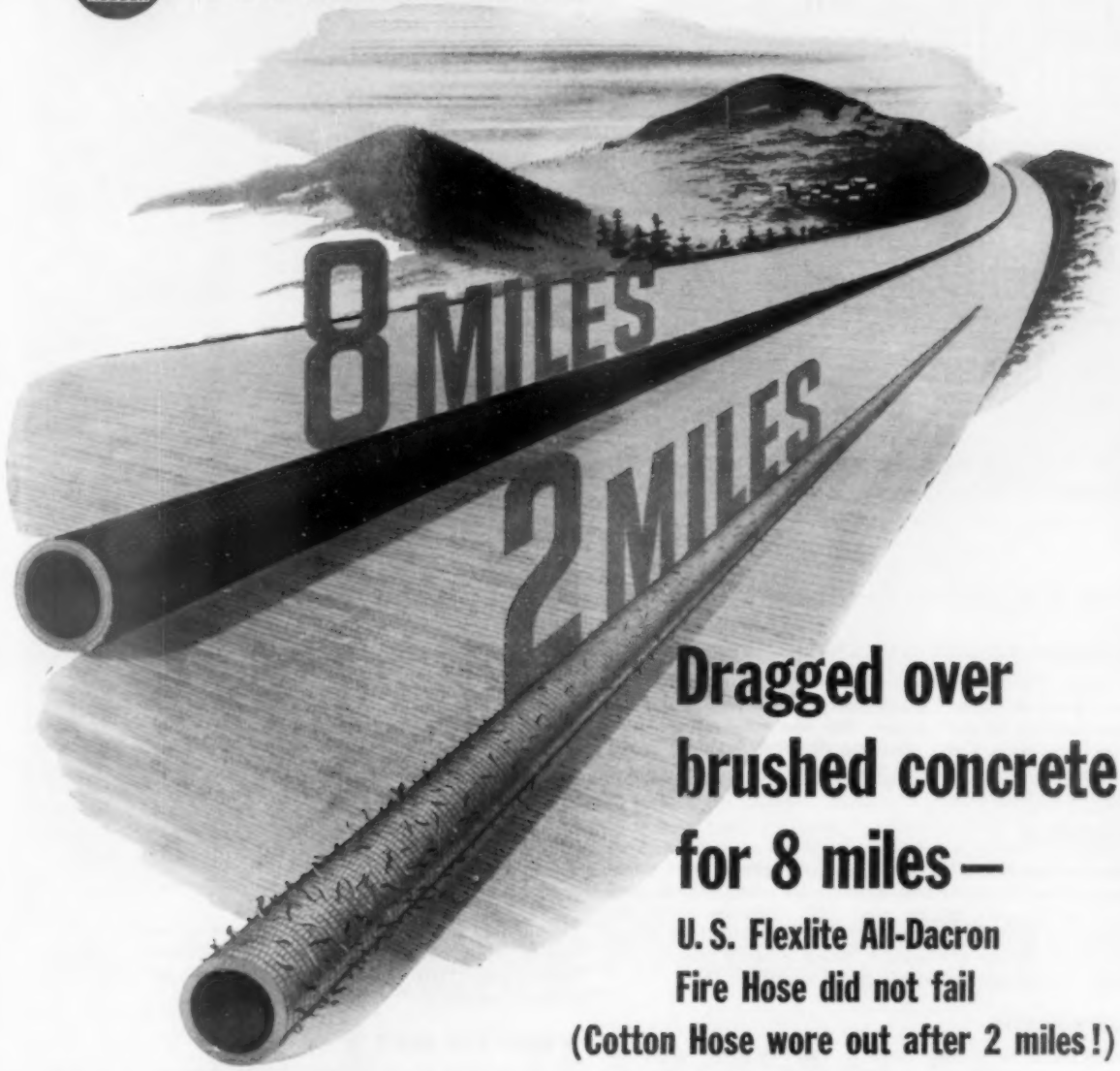
A glance at the kitchen of **Screw and Bolt's cafeteria (center)** tells the story of its cleanliness, sound planning, ample equipment. Food and supplies are purchased locally and the caterer keeps a full-time professional dietitian on the job. In the eating area, two floor-to-ceiling window walls overlook landscaped grounds.

Several of the larger plants have multiple facilities. For instance, there are two plant **cafeterias at Chrysler (bottom photo),** which together accommodate some 4000 employees. Restful music and a conveyor belt to ease collection of soiled dishes are soothing extras. An executive dining room for 50 and an office cafeteria accommodating another 270 complete Chrysler's eating facilities.

A number of this year's contenders staffed and managed their own cafeteria and vending services. As it happens, though, each of the Top Ten winners contracted these services to outside specialists. Five of the seven plants with cafeterias subsidize them.

Turn the page

FLEXLITE ALL-DACRON FIRE HOSE



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U.S. Flexlite Hose brings you these other advantages: It won't absorb water and hence can't freeze. It is highly resistant to oils and chemicals. Every foot is subjected to five hundred pounds test pressure before leaving the factory.

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Neat bank of vending machines lines the clean, tile-floored eating area at Brunswick-Balke-Collender's new plant. Nearby tunnel leads under the street to a fully equipped cafeteria with a bakery and a soda fountain.

Ten Employee Feeding Tips From This Year's Winners

BRUNSWICK-BALKE-COLLENDER

A neatly fenced in-plant eating area next to washrooms has a bank of vending machines for employees who carry their lunches (photo above). For the others there is a tunnel leading to the cafeteria in the main building across the street. There, workers find a plush dining area and a modern recreation room.

CHRYSLER

Two in-plant cafeterias boast conveyor belts to carry soiled dishes from the eating area to the dishwashers, which saves time and tempers (photo, page 162). Separate dining facilities are provided for office personnel. Mealtime music is another feature at Chrysler. Some vending (candy, cold drinks, cigarettes) augments the cafeterias.

FLICK-REEDY

Cafeteria is separated from a well-equipped recreation area by a folding wall. Another wall is painted off-white, lends itself to a variety of decoration, such as the adhesive-backed colored pennants shown on page 160. The company plans future improvements that will include a walk-in refrigerator and freezer, and a patio for outside dining.

G-V CONTROLS

Trays are roughly triangular, permitting four people to sit together at small square tables and eat directly from trays. Conversation is easier than with side-by-side seating. Bonus: Dishes and trash, already on trays, can be carried quickly to collection point by diners. Outside, there's a patio with picnic tables.

IDEAL CEMENT

All office and plant employees carry their own lunches, eat together in an extremely neat, pleasant dining area. It has a tiled floor and a picture window wall overlooking a low mountain range. Overhead, there's a sweeping, thin-shelled concrete barrel roof. In the same wing are lockers, washrooms, and a few foremen's offices.

KENNECOTT REFINING

Three separate vending areas save walking time for employees. One is for the main office, lab, and personnel buildings. One is in the manufacturing area. One is for the maintenance crew in their own building. Vending provides hot soups, sandwiches, hot and cold drinks, etc.

ROYAL McBEE

Dining area is at one end of the office wing, with floor-to-ceiling windows on three sides for maximum sunshine (photo, page 110). A door on the side leads to a lawn for outdoor eating.

SCREW AND BOLT

Two significant extras in this cafeteria: a complete in-plant bakery, and a permanent full-time dietitian. And it provides a view, with a pair of floor-to-ceiling window walls overlooking an expansive lawn.

SPRINGDAY

Vending facilities only, attractively arranged along one wall and given striking appearance by an over-all valance with back-lighted artwork depicting applications of the company's V-belts. Later, as the plant expands, a cafeteria will be provided.

WESTERN ELECTRIC

Two main cafeterias at opposite front corners of the building, handy to plant and offices, serve over 5000 employees. One, with its own loading dock and storage areas, prepares food for both, has hot and cold carts for transportation between them.

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Prophet carefully prepares well-balanced, eye-appealing foods in more than 200 units in 27 states and the District of Columbia. These efficiently operated Prophet units provide food services, from coast to coast, in plants serving all phases of industry; bank, insurance and office buildings; broadcasting centers; hospitals; colleges and universities; summer camps for boys, girls and adults; important specialty and department stores; military establishments and public restaurants.

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TOP PLANTS' MAINTENANCE TRENDS

1. Maintenance status is looking up.

2. Designing maintenance budgets in new plants is still a matter of cut-and-try.

3. Equipment records are accepted as a basic maintenance management tool.

4. Start-up of new equipment requires approval of major engineering and operating departments. It's no hit-or-miss affair.

5. The practice of filing manufacturers' manuals is catching on.

6. Plant lubrication programs are relying heavily on oil company surveys.

7. Wider adoption of hauling and riding equipment is cutting down non-productive maintenance man-hours.

8. On-the-job training is meeting many of the problems of new skills required today to operate and maintain modern and increasingly complex facilities and equipment.

9. Mechanical cleaning equipment is simplifying and saving time on plant housekeeping chores.

10. Plants aren't yet sold on the need for departmental breakdown in consumption and costs of utilities.

11. Maintenance stores control is still loose on economics of inventory, failing to distinguish spare parts from supplies.

12. Even with careful advance planning of the move from an old to a new plant, chances are 50-50 that a new plant can expect some upsets in the start-up schedule.

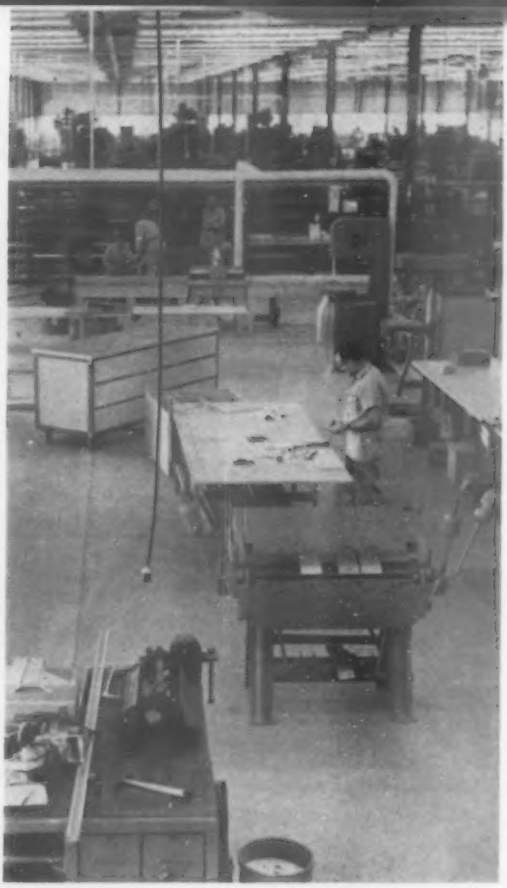
13. Two-dimensional layouts and vibration isolation pads are in high favor generally.

14. Roomier shops and more comfortable and efficient offices provided for foremen and staff portray growing recognition of the maintenance function.

TOP PLANTS OF 1960

MAINTENANCE—

The Function Grows In Size, Stature, And Sophistication



This open, well-lighted maintenance area at Royal McBee is a far cry from the once-usual dusty, unwanted corner.

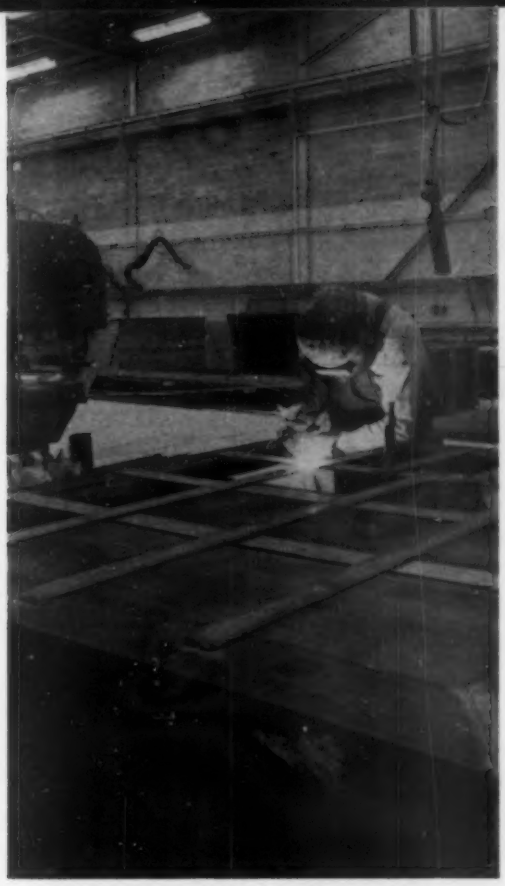
There are plenty of road signs that point to the growing importance of the maintenance function in industry. FACTORY editors posed some 60-odd questions to all Top Tenners on the management of maintenance. They concerned people, equipment, and procedures. The answers are enlightening, sometimes as a consensus, other times as an individual plant technique, even though there's no one unique or outstanding new feature detectable in these maintenance practices.

While ten plants normally don't make a good sampling, these are the Top Ten of the latest and best design, and what they say takes on extra meaning. That's the reason for this digest of experiences and opinions about maintenance activities and problems among the Top Ten.

The above list (left) is a quick summary. And you'll find supporting facts for each item in the correspondingly numbered briefs that follow.

1. Maintenance status. The growing importance of the maintenance function seems to be reflected in the plant executive to whom the manager of maintenance reports. In the Top Ten the manager of maintenance is in the top or second echelon. Also, most of the titles

Kennecott's blacksmith shop converts steel bars to special "push pins" used to dislodge anodes from their molds.



A welder repairs a charging door for an anode furnace in one of several maintenance shops at Kennecott Refining.

of the maintenance head point to a separation of that responsibility into a major function by its own right. Except for the smallest plant (which has only two maintenance men—and even here they report to the factory manager), here are the nine titles of the maintenance head and his respective boss: **(1) Plant engineer—factory manager, (2) superintendent of maintenance—manager of manufacturing engineering, (3) factory manager—president, (4) maintenance supervisor—superintendent of operations, (5) maintenance superintendent—operations superintendent, (6) plant engineer—production manager, (7) superintendent of engineering and maintenance—vice-president, (8) plant engineer—plant manager, (9) assistant superintendent of plant services—operating superintendent.**

Except for the smallest plant (where the ratio is 1:150), the ratio of maintenance people to all workers in the plant (direct and indirect) runs from a low of 1 to 25 to a high of 1 to 1.6. In this last plant, a heavy-process industry, 61% of all workers are maintenance men. Most of the other plants range around 7%.

2. Maintenance budgets. Setting up a budget for a new plant is a common problem. How do you establish realistic goals without actual experience data? Four plants relied on experience data from old plants. Of these, one based the budget on the ratio of maintenance to production workers, modified by the increase in floor space per employee. The other three built figures on projections of production hours.

One plant made a bed-rock analysis of daily maintenance requirements with the help of its industrial engineers. Two plants set up trial schedules based on production hours. One of these established separate goals for maintenance of machines, utilities, building repairs, and janitorial services. Two of the ten evaded the budget problem altogether.

3. Equipment records. Nine of the Top Ten have set up some kind of equipment record right from the start of operations. And the tenth plant has definite plans for such records. This is in strong contrast to last year's Top Ten roster, when only two plants saw the wisdom of this procedure.

Is this spurt in prompt equipment records significant? We think so. Plants are finding out by experience the value of good maintenance records.

Turn the page

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MANUFACTURING CORP.

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Milwaukee, Wisconsin

MAINTENANCE—A GROWING FUNCTION

Begins on page 166

The question no longer is "How useful are equipment records?," but "What details should they contain? Who should provide them? What about manually posted records vs. machine-tabulated?" Let's see what answers this year's crop of Top Ten plants can give.

Only one plant is using machine-tabulated records. They apparently originate in the cost accounting department. Another plant is using a neat set-up on edge-punched cards (guess who—Royal McBee, of course). In those plants using manual systems, maintenance clerks do the posting. Such records originate and remain in the maintenance office.

Character of the records varies considerably. Several contain only basic inventory cost and depreciation data for plant asset purposes, especially those kept by the accounting office. In such cases maintenance may keep a separate record of continuing costs. Most of the plants combine preventive maintenance schedules with cost records. In about equal proportions some plants include all data—PM tickler, machine and operating data, utility requirements, and so on—on one card. Others use separate cards for major items such as mechanical, electrical, lubrication, and building maintenance. Not all plants include all facilities, but all at least keep machine data.

4. Start-up procedures. How popular is the formal "sign-off" procedure? Half the Top Ten plants report they follow a formal method. The other half say they don't. Yet everyone pursues an informal routine that is equally effective. In all ten plants one or more departments take part in trial runs.

In one plant with a formal procedure, each machine gets a routine check by the tool engineer, methods engineer, and a representative of the inspection, production, and time standards departments. They must approve the equipment within 24 hours after tender of release (or re-tender if disapproved). Acceptance is followed by a training and break-in period.

Another plant requires approval by central engineering, plant engineering, production, industrial engineering. A third plant makes pre-operational tests by engineering, maintenance, and the safety inspector. One company uses a formal equipment installation checklist for correct layout, mechanical features (mounts, piping, guards), electrical features (wiring, rotation), machine features (alignment, lubrication).

The pattern of informal procedures is similar, even if it's not a paper check. One plant holds a series of meetings (with written instructions) to indoctrinate men on major equipment. These meetings include people from maintenance, production supervision, and one or all three project engineers from plant layout, tooling, and industrial engineering. At this time, manufacturer's manuals, parts lists, waranties, and the like, are turned over to maintenance.

Is debugging a big problem? In most Top Ten plants, no. One plant says it varies greatly, is always done under pressure, hence is always considered serious. Another plant feels debugging is a normal part of start-up of all new machinery. So what is normal? Two plants report costs in terms of 1 to 1.5% of total main-

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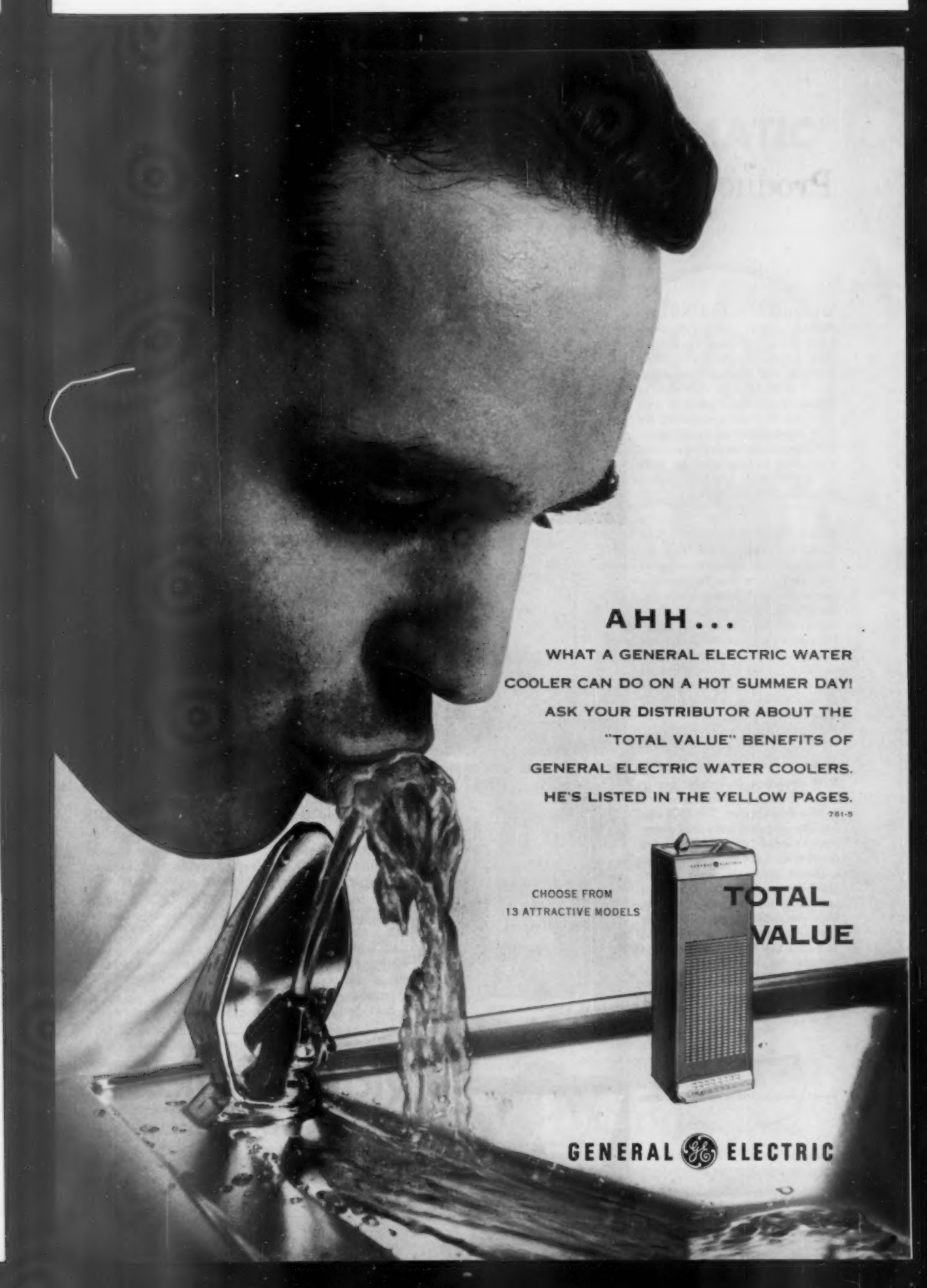
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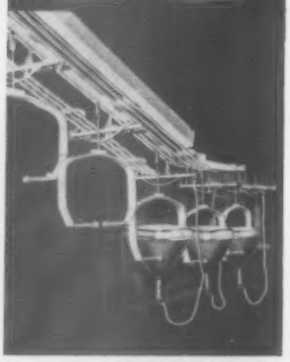

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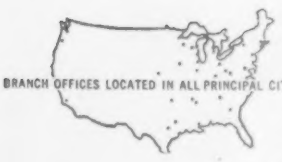

With the general trend of increased sales at lower "net earnings," industries of all types have to face the fact that increased sales, alone, are not the answer to a "profit-improvement." Production plants, from receiving through shipping, should be thoroughly inspected . . . costly procedures and handling methods that "eat-up" profits should be changed . . . antiquated equipment should be replaced with modern machines and systems.

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Begins on page 166

tenance man-hours. A third quotes 5% on new machinery, more on transferred machinery. Average of another plant was 6%, within a range of 4 or 8% for single equipment. This was the highest.

5. Equipment maintenance manuals. You'll find them carefully filed for easy reference in nine of the Top Ten plants. The tenth plant shrugs off the need because "we mostly have specially designed equipment." Seven plants make sure they get an instruction manual with each new piece of equipment by requesting it on the purchase order. One of them emphasizes that the manual is considered part of the receival check. Two other plants insist on manuals only where the type of equipment requires such special information. In several cases, a project engineer, or a manufacturing or maintenance engineer translates the manual into specific instructions for the people in the maintenance and operating functions.

In each case two or more copies are kept for handy reference. General practice is to file one copy in the maintenance files, another in the engineering or manufacturing files. One company fastens a copy to the equipment. Third and fourth copies may go to places such as maintenance stores, craft foremen, operating foremen, and preventive maintenance engineer.

6. Lubrication practices. The fact that six Top Ten plants engaged an oil company to help set up their lubrication programs is significant. It probably means several things. Modern highly mechanized equipment needs good lubrication. Plant management wants as few production outages as possible. And it recognizes the part good lubrication plays in this goal. Also, maintenance management realizes selection and application of lubricants is getting to be a job for an expert.

Every one of the Top Ten schedules lubrication in some form or other, and assigns personnel for the job. Only one plant reports supplementary lubrication by operating personnel. Five plants use a checklist as a guide for location of lube points, frequency of lubrication, and type of lube. Three plants use machine tags or charts, another an area chart schedule. In six plants lube men use lube carts. One plant has adopted a standard grease fitting on some 2000 pieces of equipment to simplify the lube equipment. Another plant boasts of automatic lubrication on 40% of its equipment—it aims to eliminate the human factor wherever possible. A third plant favors color-coded lube points and lube equipment to insure proper application.

7. Material-handling and transportation equipment. In six of the Top Ten the maintenance department has its own transport equipment. One small plant disclaims any need at all. Three plants don't see any need for such departmental monopoly now or in the future. One says outright it relies on its production control office to lend equipment, and aims to keep this investment to a minimum. In contrast, one of the lucky six states it plans to buy material-handling and time-saving equipment solely for maintenance whenever it proves economically feasible.

The type of equipment considered economically feasible apparently varies from plant to plant. Most popu-

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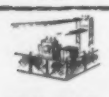

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Begins on page 166

lar equipment is the fork-lift truck (in all six plants)—in one or more units, both gas and electric powered. Two plants use big rubber-tired mobile cranes. Several plants have tractors. Other items are boom trucks, flatbed and pick-up trucks, front-end loaders, and mobile hydraulic platforms (low- and high-lift).

One plant has caught the idea of time-saving transport equipment for maintenance manpower. It gave its foreman a power scooter, and provided each of seven mechanics with a wheeled tool cart. Then it tried a tricycle tool cart—with such success it decided to convert all seven of the carts to pedaling.

8. Training for new maintenance problems. Is the type of modern plant services and manufacturing equipment raising any new problems in maintenance? Only two plants said there were no abnormal problems that their maintenance personnel couldn't take in their stride. But even they implied the need for some manpower training on new and more complex equipment.

Most widespread problem reported was operation and care of air-conditioning equipment. Close behind came care of special facilities such as heat pump, water supply plants, and sewage and sanitation disposal plants. Water problems crept in a-plenty. One plant had to learn how to manage a water supply system involving deep wells, water recovery, and water treatment. Another plant was new at handling water towers and recirculating systems.

Only one plant had to add a specialist. It set up a new department under an instrument engineer to maintain a central control system. But all plants had to do some training. Even men for grounds maintenance of landscaped areas needed training by contractors, equipment dealers, and nurserymen.

Despite the variety and complexity of new equipment, no plant complained that manpower training was hard to get. If anything, the reverse was true. In most plants manufacturers or their representatives provided ample on-the-job training during erection or start-up. One plant that uses pneumatic tools in assembly operations sent its machine maintenance foreman to the vendor's plant for two weeks' training. In another case the manufacturer's representative recorded the training procedure on tape for later playback.

9. Plant housekeeping. More Top Ten plants than not are handling their own housekeeping duties. Only three plants contract out to a service organization for cleaning of factory areas.

Responsibility for plant housekeeping generally falls to maintenance. Proponents of separation of these two functions apparently haven't found a sympathetic Top Ten ear. In two plants an operating function shares the responsibility—one for cleanliness of away-from-aisle areas, the other for all area housekeeping—while maintenance guards only sanitation.

Housekeeping crews range from one or two men on powered floor-sweepers in several plants to 22 men in one large plant using various types of mechanical equipment to keep some 700,000 square feet tidy. This equipment includes a powered street sweeper for outdoor areas, walkie-type powered sweepers for indoors,

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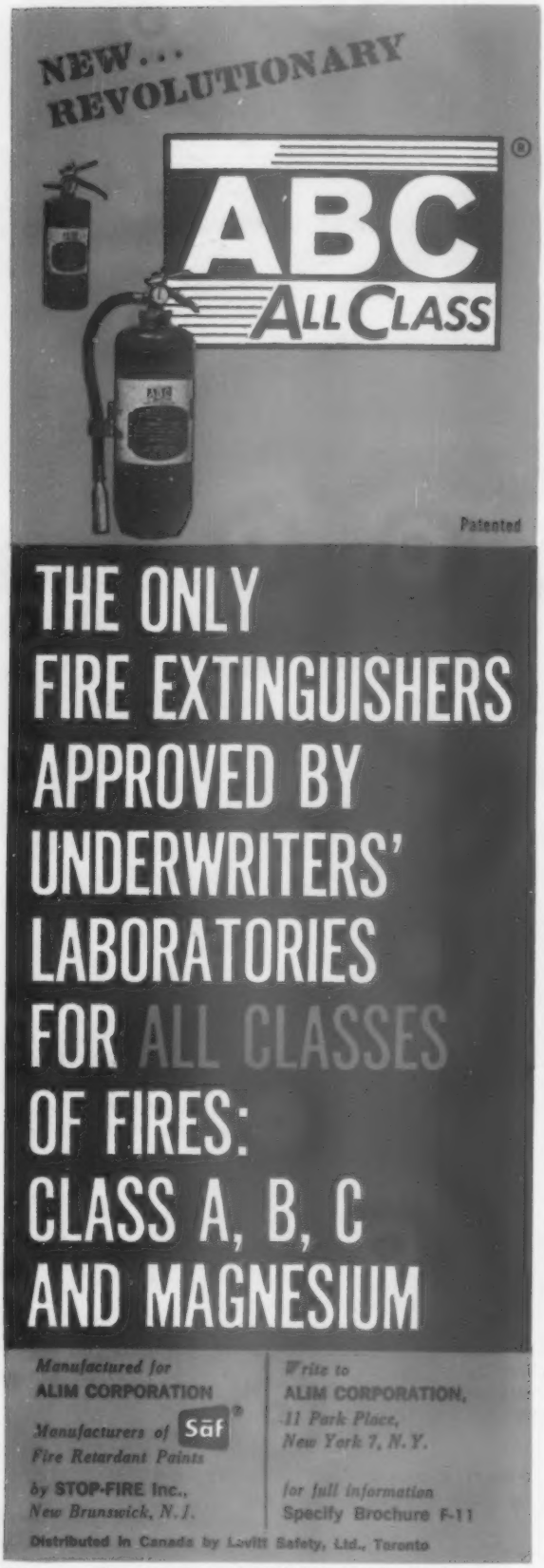
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for full information Specify Brochure F-11
Distributed in Canada by Lavitt Safety, Ltd., Toronto

Begins on page 166

steam and vacuum cleaners, floor polishers. Other equipment used by the Top Ten includes automatic scrubber-vacuum combinations, vacuum power sweepers, and battery-operated floor scrubbers. Powered equipment is commonplace in today's new plants.

10. Utility lines. Every Top Ten plant seems to know where all its utility pipelines go, whether above or below ground. They all have accurate plot plans. They don't have to hunt for shut-off points or where to add new taps.

But as yet there's little interest in knowing how these pipelines distribute their wares. Presumably, all the plants have meters on the mains to indicate total utility consumption. Only one plant reports three sub-meters on its gas lines—two for major production operations, one for space heating. (Sometimes different rates require this.) Another plant says pipelines are valved to all departments (normal good practice), but are not metered. This may or may not be done, depending on need for tighter cost accounting.

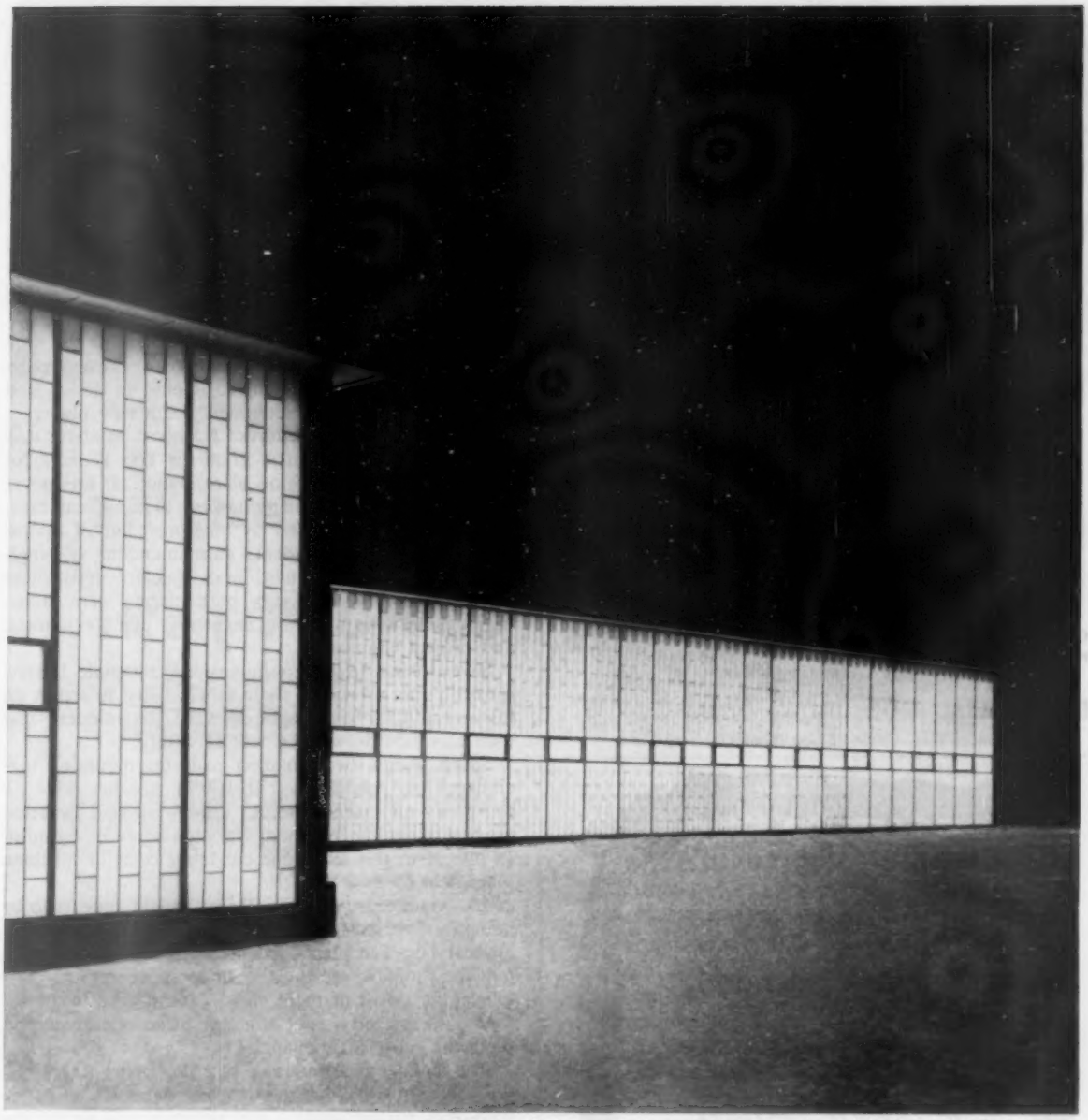
11. Maintenance storerooms. Six Top Ten maintenance departments have their own storerooms. Four rely on a central storeroom that carries all plant supplies. But in eight cases the maintenance head or junior calls the shots as to type and size of inventory.

Real test of a maintenance storeroom is in its ability to keep an optimum level of inventory. A study of the method of Top Ten control of spare parts and supplies indicates most plants don't seem to differentiate between long-term spare parts and short-term supplies in setting up inventory quantities. Both types apparently are handled on a max.-min. basis, with no regard for an economic evaluation that should be different for each. Inventories of supplies depend mainly on factors such as usage, economic order quantity, and delivery dates. But spare parts inventories depend more on factors of probability of failure, cost of machine downtime, possibility of obsolescence, cost of spare part (i.e., a determination of cost of carrying the spare part as against not having it).

12. Moving problems. Of the seven Top Ten that moved from old into new plants, three had major problems. One moving program worked like a charm—production enjoyed highest dollar volume the first full month in two years. This plant set up a strict timetable and sequence chart of machinery moves by number and location. It used a master plan, marked the new floor and tagged machines accordingly. Most machines were moved out within an hour, spotted and in operation in new plant within an hour after arrival. Production workers were shifted to another machine in the old plant, or transferred to a readied machine in the new plant. On an around-the-clock basis, the complete move took one week.

Equipment deliveries plagued one plant. Delays ranged from weeks to months, largely because vendors gave unreliable promises. Remedy, says this plant, is to include penalty clauses in purchase orders for failure to meet dates. Also, to assign an expediter to bird-dog critical equipment.

Jurisdictional labor hassles harassed another plant in



Only 113 Kalwall panel units were needed to enclose the entire Edburgh Manufacturing Corporation plant in Newburgh, New York. Architect: Ian M. Horne, East Orange, N. J.

it's a Kalwall translucent factory

and it costs less to light . . . less to heat . . . less to build

No supporting framework . . . 1000 sq. ft. of wall area enclosed per day . . . the highest insulation value of any light transmitting material . . . and an installed cost less than any other window wall system. These are just a few of the revealing figures on this Kalwall translucent factory at Newburgh, New York. For full details on the Kalwall Panel Unit Wall system, write:

Kalwall Corporation, Dept. J-50, 5 Union Street, Manchester, New Hampshire

DOLIN MOBILE STORAGE SYSTEMS

CAN SOLVE YOUR SPACE AND STORAGE PROBLEMS

ABOVE—Mobile stock parts installation reclaimed app. 13,000 sq. ft. of valuable factory floor space for productive use and added storage.

LEFT—Aircraft stock parts were actually tripled within original supply area with this mobile system.

ONLY 1 AISLE FOR 6, 8 OR MORE ROWS! Aisle elimination is our proven method of "wall-stretching." Write for "IDEA KIT."

FREE LAYOUT SERVICE. WRITE DEPT. MF

DOLIN METAL PROD., INC. 313-15 LEXINGTON AVE. BROOKLYN 16, N. Y.

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*Proven during more than 5 years of industrial use

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MAINTENANCE—A GROWING FUNCTION

Begins on page 166

the installation of new auxiliary equipment. The problem centered around what was considered as maintenance of operating equipment (handled by plant—CIO) and what was construction or installation work (handled by contractors—AFL). It required continuous negotiation between company people and AFL stewards, or their district representatives, with contractors involved. Remedy, says this plant, is to have equipment and machinery loaded, hauled, and placed or anchored by an outside contractor or cartage firm, and to use own personnel for disconnecting and reconnecting.

Rehabilitation of old equipment fouled up the time budget of a third plant. It ran into excessive repairs and revisions, is now convinced it pays to design and build or purchase new equipment for a new plant.

13. New layout procedures. No question about it—all echelons of management in all the Top Tenners got into the act on decisions on plant layout. It was never a one-man or single-function job. In a typical case, final layout was screened by vice-president of operations, plant superintendent, superintendent of engineering and maintenance, and specific department supervisors. Others strongly participating were industrial engineers, production engineers, plant engineers, and project engineers.

Seven plants used two-dimensional template layouts (possibly more, because three others failed to report on this question). None mentioned 3-D techniques—one used elevation drawings where necessary.

Seven plants used isolation pads for mounting machinery—two plants used it 100%, another 95%, a fourth on all machine tools. Others applied isolation mounts to equipment where vibration could be harmful. In one plant this technique cut labor costs of machine placement by 20%.

14. Maintenance shops. More thought appears to be going into the cost and speed of maintenance services. Several Top Ten plants specifically located their maintenance shops where they could serve operations most efficiently. Most of them chose central core locations. One plant picked a spot adjacent to an operating area requiring most maintenance.

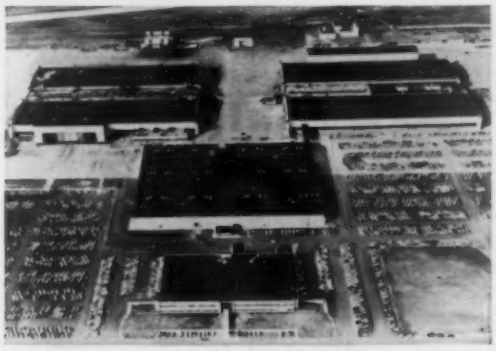
The maintenance foreman is getting better treatment, too. His kingdom has now swung from the old-style high-desk parked against a dark shop wall to an enclosed well-lighted office with large flat-top desk, visitors' chairs, and file cabinets. He doesn't carry his office in his hat any more. He may even have a hat-rack. What about the maintenance supervisor? He's just as well treated, if not better. In some cases he has been moved from the shop office to a main-office tier, or even a spot in mahogany row.

Only two Top Tenners—the two largest in square-foot area—have provided area shop locations as well as a central shop. In one of them, a 900-sq. ft. area accommodates only four men who must be handy for departmental breakdowns that otherwise could make production costs look sick. In the other, three area shops handle test, machinery, and electrical maintenance. Some other plants still station men in specific areas, but wield central-shop control. **END**

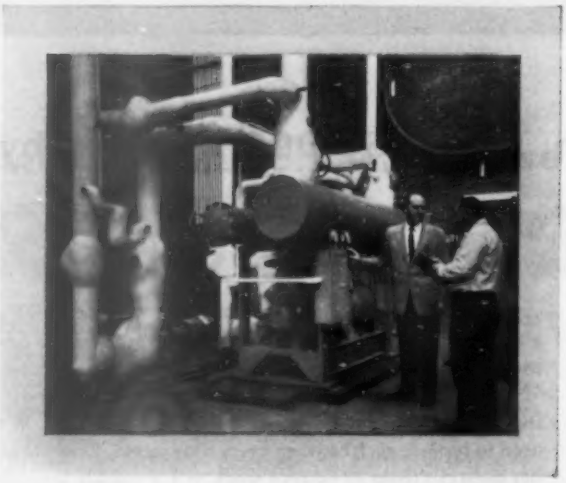
 For more facts Circle 752 on Reader Service Card

American Airlines' Jet Maintenance and Engineering Center, Tulsa Municipal Airport

In the jet age ...it's Acme



American Airlines has "staked out" its claim on the jet age with a $20,000,000 expansion program at the AA Jet Maintenance and Engineering Center, Tulsa Municipal Airport (above). Under the program almost 600,000 square feet of space have been added . . . new shops for turbine engine overhaul, fuel control, jet airplane overhaul, jet test cells, to mention a few. And at a cost of some $3.5 million, more than 15,000 kinds of new items for jet age service and maintenance have been gathered at the Jet Center.



You name it . . . ultrasonic cleaners, mass spectrometers, automatic pilot mock-up. American has it . . . the finest, most modern equipment there is, including Acme Packaged Chillers. In fact, in four areas . . . jet fuel control testing rooms, standards laboratory, gyroscope overhaul shop and two new jet engine test cells . . . where air conditioning and humidity control requirements are critical, you'll find ever-dependable Acme chillers at "the heart" of the systems.

Yes, for delivering "the goods"... for minimum-maintenance, trouble-free performance you can *depend* on Acme. Ask an Acme user . . . ask Hugh E. Gallemore, Manager of Facilities Maintenance at the Jet Center.

Acme INDUSTRIES, INC.

JACKSON, MICHIGAN

Manufacturers of quality air conditioning and refrigeration equipment since 1919

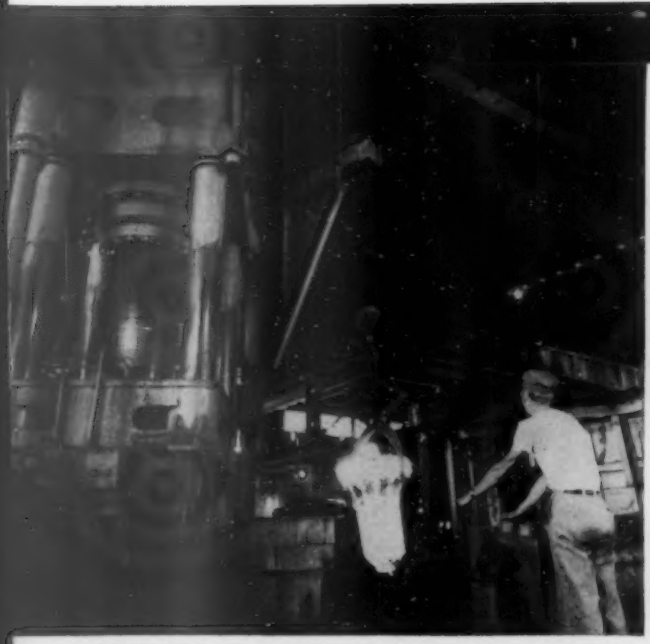
Bearing life increased at least two and one-half times with Gulfcrown Grease E.P. on Green River Steel soaking pit covers.

Gains 36% more production, saves $5,000 a week, by

GULF MAKES THINGS

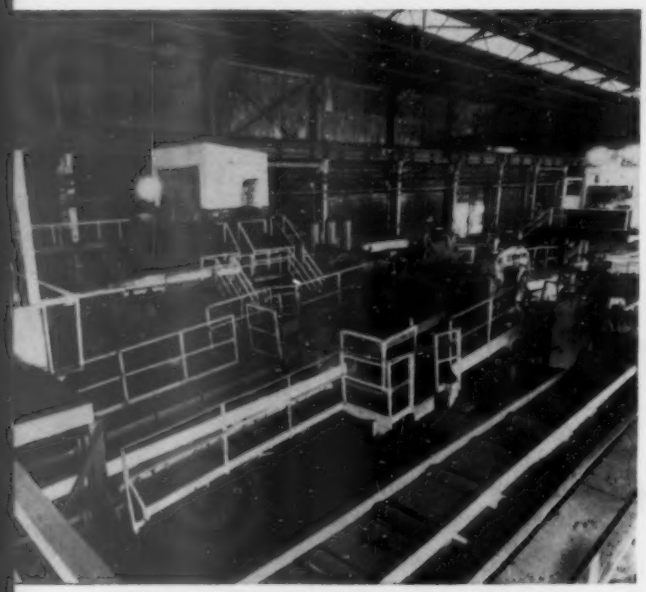
"We've discovered what important savings can be made by simply changing from one grease to another," says Henry J. Werner, Maintenance Superintendent, Green River Steel Corporation, Owensboro, Kentucky. "We were having trouble with the bearings on our soaking pit covers. The grease kept melting out. This meant shutting down the pits, at a downtime cost of $650 an hour. When they're down, we're not pressing steel."

Gulf engineers recommended Gulfcrown Grease E.P., a multi-purpose lithium base grease formulated for unusually heavy bearing loads and high temperatures. "Now," Mr. Werner says, "we have not changed a bearing in the ten weeks the new grease has been in use. We used to replace each bearing every four weeks. Downtime has been cut from 12 hours a week to 4, a weekly savings of $5,000. This has resulted in an increase of our average



Gulf Harmony oil protects against rust and foam in hydraulic systems of Green River's forging presses.

Manipulator, lubricated with Gulfcrown Grease E.P., places billet in forging press.



Longer gear and bearing life on Green River's blooming mill, intermediate and finishing stands is assured by the use of Gulf E.P. lubricants.

Left to right, Marshall Ringo, Gulf Sales Representative, Thomas J. Bartlett, Jr., Gulf Owensboro Distributor, Nelson C. Walker, Executive Assistant to the President, Green River Steel Corp., and George Carney, Gulf District Manager.

switch to Gulfcrown® Grease E.P.

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production of 36%, or 702 tons a week."

Based on this experience, Green River plans to standardize on Gulfcrown Grease E.P. for grease applications. To protect against rust and foam in hydraulic systems throughout the mill, Gulf Harmony® oil is used.

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Pittsburgh 30, Pennsylvania

GULF

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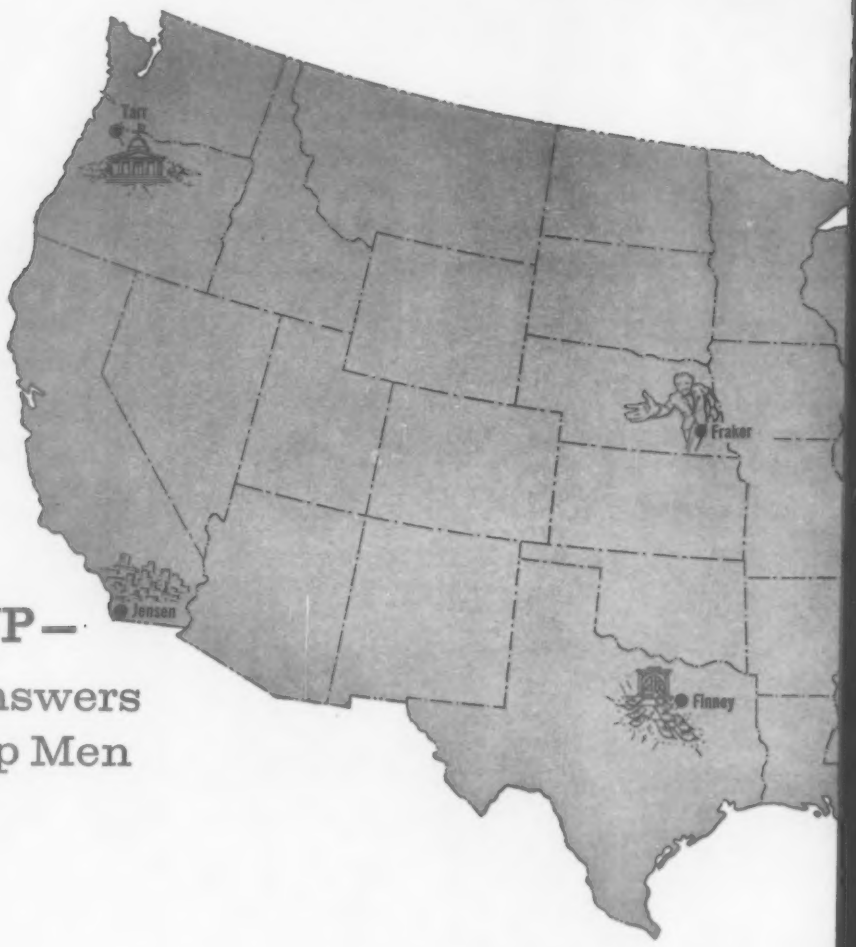


U.S. ROUND-UP—

Site Selection Answers From Twelve Top Men

MOST PLANT LOCATION decisions are a once-in-a-lifetime affair, except for a few large companies. So, regardless of a man's skill at solving most plant problems, a lack of first-hand experience means he'll need specialized help in picking a new plant home.

For this reason, FACTORY's editors picked some frequently asked questions to put before 12 industrial development professionals. The men we chose are in an excellent position to comment on the challenges—and pitfalls—of selecting a plant site.

Here are the questions FACTORY put to the experts:

- **Can you give an example—an extreme one—of the high cost of poor site selection?**
- **What are the two most important factors in making site selections?**
- **What are the most common mistakes?**
- **What's the greatest contribution you professionals can—and should—make in the next five years?**

You'd expect that the answers from these men would reflect some closely parallel views—and some strikingly divergent. You won't be disappointed. The comments that follow include both agreements *and* controversies. But all are helpful and stimulating. You'll get an excellent background here for selecting the proper type of industrial development organization.

Q. Can you give an example—an extreme one—of the high cost of poor site selection?

1. ANDERSON

The expensive donated land . . .

We know of one firm that selected a site without thorough investigation because it was donated by the community. The subsoil conditions were horrible, and the additional money spent on foundations would have purchased several good sites. Watch out for seemingly harmless inducements like this donated land, tax concessions, and the like.

2. BISHA

A new building ripped out . . .

The "X" Company purchased what appeared to be a desirable plant site. They began construction before requesting the railroad to install spur trackage. Then railroad engineers found the plant was so positioned that the sharpest available track curve would still cut off a corner of the brand-new building. Result: Part of the building had to be ripped out. This meant major structural changes, unnecessary expense, valuable time lost.

12 Site Selection Experts

1. Anderson, H. A., Executive Vice President and General Manager, The Austin Company (Engineers & Builders), Cleveland.

2. Bisha, Raymond E., Director of Industrial Development, Louisville and Nashville Railroad Company, Louisville, Ky.

3. Blakeley, Gerald W., Jr., President, Cabot, Cabot & Forbes Company (Real Estate Development), Boston.

4. Busse, Paul, Executive Secretary, Newark Economic Development Committee, Newark, N. J.

5. Cary, Glover H., Manager, Industrial Development, Texas Gas Transmission Corporation, Owensboro, Ky.

6. Coates, James O., Area Development Engineer, Consumers Power Company, Jackson, Mich.

7. Finney, Thomas W., Vice President, Industrial Development, First National Bank in Dallas, Dallas, Tex.

8. Fraker, John R., Executive Vice President, Lincoln Chamber of Commerce, Lincoln, Neb.

9. Jensen, Julius R., Consultant to Industrial Development Commission, City of San Diego, San Diego, Calif.

10. Tarr, Robert H., Director, Oregon State Department of Planning and Development, Portland, Ore.

11. Wood, G. Pierce, Industrial Development Coordinator, Tampa Electric Company, Tampa, Fla.

12. Yaseen, Leonard C., Partner, Fantus Factory Locating Service (Plant Location Counselors), New York (and Chicago).

3. BLAKELEY

A four-year zoning and development delay . . .

A site we found for one company cost 80 cents per square foot. The manager turned this down, bought some outlying land at about $3000 per acre. Then he ran into two years of zoning problems, had to buy two extra lots for protection, had sewer connection troubles. So his "bargain" cost $1.25 per square foot plus delay.

4. BUSSE

A short-term gain that didn't hold up . . .

Short-term gains of immediate tax savings enticed the branch manager of a large firm to relocate. He made a record and was shortly promoted. But the long-range factors of poor transportation, labor, and community services are still plaguing his hapless successor.

5. CARY

An unnoticed labor problem . . .

One plant leaned too heavily on the sole recommendations of the community it favored, accepted the town's reports without sufficient check of all the factors. An unfavorable labor picture had been glossed over and in six months the reputed good labor relations picture had deteriorated and the plant was in trouble.

6. COATES

Community costs skyrocketed . . .

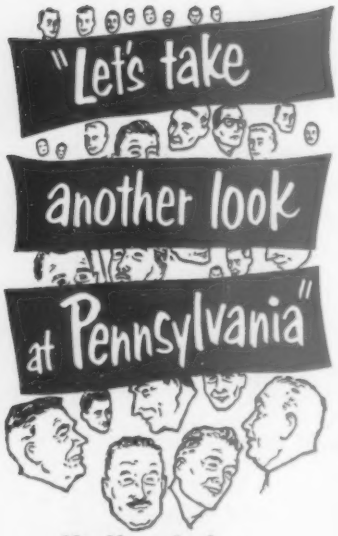
A company was treated so royally by a soliciting community—and was so oversold—that it lost sight of the true economics picture. Later, when the cost figures became clear, the operations at this branch plant had to be curtailed in order to stay competitive with other branches. And the over-zealous community was hurt too, because the expected growth didn't come.

7. FINNEY

Selectors overwhelmed by presentations . . .

There is more than one instance where the site selection group has been completely overwhelmed with presentations and telegraph, letter, telephone, and personal contacts. So much so that it was impossible to make an efficient selection amidst the confusion of extraneous considerations and matters of "expediency."

Turn the page



...that's what a growing number of industrial executives are saying and doing!

In the past four years they announced:

389 NEW PLANTS
391 RE-OPENINGS OF IDLE PLANTS
788 PLANT EXPANSIONS

(Send for the list—address below)

They are finding:

Surplus of industry-minded workers . . . Strategic locations in the great Eastern market with access to major trunk line railroads, and modern highway and Turnpike networks . . . Ports on the Atlantic, St. Lawrence Seaway and Ohio River system . . . All types of industrial raw materials and components . . . 100% low-interest plant financing in labor surplus areas . . . Choice of industrial "parks" and individual plant sites.

Excellent "tax climate"

No state personal income tax—no machinery or inventory taxes—no graduated state tax rates—no direct state property tax—manufacturing activities in Pennsylvania are exempted from capital stock, franchise, and sales taxes.

For free copy of "Plant Location Services" pamphlet, or for details on 100% financing, write or call:

Pennsylvania Department of Commerce
South Office Building
807 State St., Harrisburg, Pa.
Phone: CEdar 4-2912

SITE SELECTION ROUND-UP

Begins on page 180

8. FRAKER

The unusable site . . .

I know of a major national industrial company that made a site selection for its new plant without the benefit of normal engineering services. Following the purchase, this company found the 120-acre site was totally unusable because of sub-surface water problems. Obviously, corings had not been taken on the site.

9. JENSEN

A brand-new plant closed down . . .

A well-known electronic company built a plant, then had to close it down because of the lack of available skills for its needs, relatively high labor costs compared to their other plants, and an insufficient number of component suppliers in the vicinity. Sounds silly, but it happened!

10. TARR

Increasing transportation costs . . .

Horrible examples abound of plants established without checking into satisfactory alternates of transportation. Then costs went up as a result of the lack of competing services.

11. WOOD

Plant inadequate in two years . . .

One industry that located here in Florida less than two years ago is already facing an expensive move to larger quarters within the next few months. They didn't acquire enough property for expansion, and simply ran out of space.

12. YASEEN

An $80,000-a-year oversight . . .

One large company, intrigued with the facilities of an industrial park, overlooked the economic aspects of geography that are so necessary in establishing the one lowest-cost area. After building a plant, the company found that it was four miles out of the free city pick-up and delivery zone. Now it is paying a penalty amounting to more than $80,000 annually for this oversight.

Q. What are the two most important factors in making site selections?

1. ANDERSON

Competent analyses from experienced engineers . . .

Most site selections are made by companies who face the problem at infrequent intervals. And they just don't have the opportunity to gain a broad background of experience. Therefore, their two most important factors in site selection are: Have the location and site selection made by experienced engineers. Be sure they are getting unbiased and competent analyses.

Turn the page

If you are looking for an industrial location . . .

HERE'S HOW GPU *Site-Service* CAN HELP YOU!

Six years ago GPU *Site-Service* was set up to help growth-minded businessmen.

Although offered by an electric utility, its assistance far exceeds electric utility matters. It is a complete area development service.

At GPU headquarters and in the electric service companies, *Site-Service* offers you the assistance of plant location specialists. These specialists are ready to provide detailed information about an industrial area second to none. They will furnish economic data for individual communities and areas. They can answer your questions about labor, taxes, transportation, water, raw materials and services. Free of charge, they offer *first-hand* facts and figures that could cost you unnumbered man-hours to obtain.

What's more, *Site-Service* understands your problems. Its headquarters and area representatives know the special needs of industries of all types, large and small. They have on hand the specifications of existing buildings and available sites of all sizes. From among these can be selected those most suitable for your requirements. You are thus able to make the soundest possible final decision.

Contacting *Site-Service* is the first step towards locating for profitable growth within overnight shipping of 55 million consumers. Why not do it today? Your inquiry will receive prompt, *confidential* attention.

GPU *Site-Service*—the one central source of information for nearly half of Pennsylvania and New Jersey

GPU ELECTRIC POWER COMPANIES

Metropolitan Edison Co.
Pennsylvania Electric Co.
New Jersey Power & Light Co.
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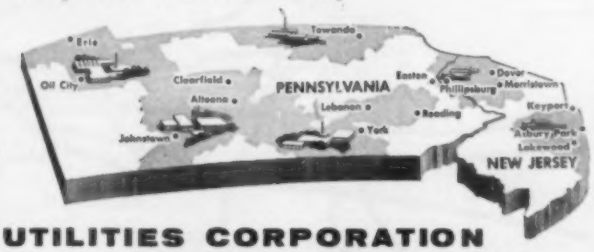


GENERAL PUBLIC UTILITIES CORPORATION

Att: Wm. J. Jamieson, Area Development Director, Dept. F-1 WHitehall 3-5600 67 Broad St., New York 4, N. Y.

For more facts Circle 755 on Reader Service Card

picking an industrial site is a job for specialists

A large corporation usually has a staff that does nothing but make surveys and prepare detailed reports on communities under consideration. The smaller corporation without such trained personnel only too often finds that lack of experience in this specialized field may cause it to overlook some highly important factor.

To any company, New York Central offers a service that goes beyond even that of the large corporation's own staff of location experts. Information about water supply, available labor, transportation costs and similar factual material is basic, of course. What Central can give you in addition is the experience of having "lived" in the community for a hundred years or more.

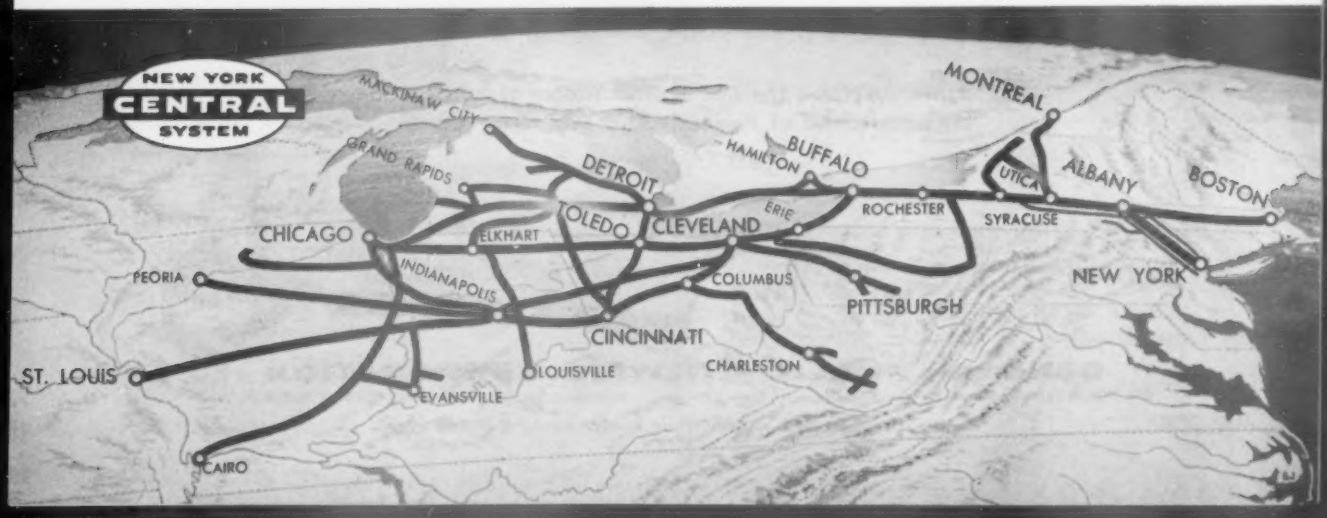
We know things about its political atmosphere, tax policies, real estate trends, labor relations that you don't learn fully by even a competent survey.

We know whom to see to get things done; where to go for financing. If you need technical advice on such things as water treatment, utilities, access rights—we have top authorities on scores of such subjects right in our organization.

For instance, there was one site which seemed to meet a company's every requirement until our engineering department pointed out that the load-bearing capacity of the soil in that particular spot was not sufficient for their heavy machinery. A nearby site provided better soil conditions plus all the advantages of the first location.

For full information about this service, write or phone: Otto W. Pongrace, Director of Industrial Development, Department J, New York Central Railroad, 466 Lexington Ave., New York 17, N. Y.

Locate your new plant on the Central and get the advantages of Early Bird fast freight and Flexi-Van rail-highway service.



SITE SELECTION ROUND-UP

Begins on page 180

2. BISHA

Geographic and economic factors; site characteristics . . .

These vary, of course, with the particular industry. But, in general, the first factor is proper geographic and economic location to assure successful operation. The next is the physical development capabilities of the site, such as acreage, contour, sub-surface condition, and so on.

3. BLAKELEY

Highways are the most important and people are next . . .

Our own activities are pointed toward distribution and research companies. In the first of these, *market* is obviously important, and its availability depends greatly on the highway pattern. In research, finding skilled people—and the 3-to-1 ratio of back-up people—is a critical factor. Getting these people to and from work is, therefore, vital. Here again, highways are important.

4. BUSSE

Site availability when *you need it; community awareness . . .*

With sites in short supply, and with redevelopment still in its infancy, the availability of raw land at the time you need it is the leading factor in making the sale. Then comes community attitude toward incoming industry. If a community isn't savvy enough to the *needs of* industry, it won't be particularly helpful *to* industry.

5. CARY

Transportation comes first, but other factors vary . . .

In almost every case, I believe, transportation is the most important factor. Other factors vary, of course, from industry to industry. In chemicals, nearness to market and raw materials is important. In electronics and in garment industries, the most important factors would be available labor and an attractive labor rate.

6. COATES

Labor and transportation; community attitude . . .

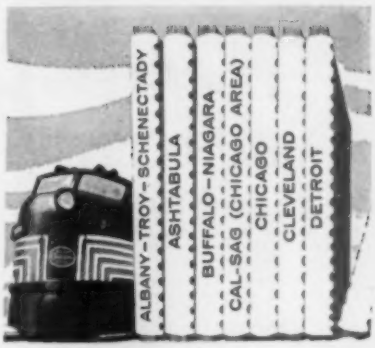
I suppose labor and transportation are the two most important factors. But, all other things being equal or nearly so, community *attitude* sometimes overshadows economics, and industry is motivated to locate by *emotion*. To get my point, try this some time: When you're next on a driving trip, pass through four similar towns. You'll quickly form an impression of which town you like best. And most of your emotions will be based on the communities' *attitudes* toward themselves.

7. FINNEY

Labor and markets head my list . . .

My most important two factors are labor and markets. Labor includes supply, wage rates, labor climate, and labor laws. And for markets I imply a "centered" position, or the ability to manufacture or distribute *from within* the market, thus tending to lower the total cost of the product delivered to distributor and customer.

Turn the page



Facts for site seekers

Each of these area brochures contains a wealth of information on such subjects as available labor, transportation, raw materials, local government and taxes—together with a listing of some selected plant sites, complete with contour maps and aerial photographs.

Please specify the areas in which you are interested:

1. Albany-Troy-Schenectady
2. Ashtabula
3. Boston
4. Buffalo-Niagara
5. Cal-Sag (Chicago Area)
6. Chicago
7. Cleveland
8. Detroit
9. Elkhart
10. Gardenville, N. Y.
11. Hudson River Valley
12. Indianapolis
13. Lorain-Elyria-Sandusky
14. New York City Area
15. Rochester
16. St. Lawrence Seaway
17. Syracuse
18. Utica
19. Western Massachusetts
20. Youngstown
21. Industrial Parks in Illinois, Ohio, New York, Massachusetts, and Michigan

For the brochure you wish, write: Otto W. Pongrace, Director of Industrial Development, Department J, New York Central Railroad, 466 Lexington Avenue, New York 17, N. Y.

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This Unique Service Is Yours ...Simply For The Asking

Serving the Northern Plains
Northern Natural Gas Company
General Offices: Omaha, Nebraska

SITE SELECTION ROUND-UP
Begins on page 180

8. FRAKER

Reliable data and community attitude . . .

The most decisive factor in guiding a plant site-seeker toward his million-dollar decision is the ability of the community organization representative to furnish immediately all the factual data and services necessary to help make that decision. The second most important factor is the community attitude and the business climate.

9. JENSEN

Community attitude and markets, with labor as a close third . . .

Business is sensitive. It goes where it's wanted. It stays and expands where it's well treated. In my book, *community attitude* is the most important factor in plant location. Next comes *market*, insofar as this term reveals both consumer as well as labor supply. And I break down the term "labor" into three factors, given in descending order of importance: availability, skill and intelligence, and then—and only then—its rate.

10. TARR

Business climate comes first; next is livability . . .

Business climate is the most important. It's that complex of tangibles, like taxes, and intangibles, like acceptance by the community of the new industry.

Because today's premium employee is scientifically or technically trained, he is inclined to feel more loyal to his family and his technical society than he feels to his company. Therefore, it behooves the company that wants his services to provide him with a nice plant, a fine vacation land, and a maximum of five to ten minutes travel time from plant to home. These are some of the factors that come under my term of "livability."

11. WOOD

The proper business opportunity . . .

We consider that there are three general types of industry locating in Florida: market-oriented industries attracted because of the growing population and rapidly expanding markets for a large variety of products; industries that find Florida's natural appeal makes recruiting easier for technical people and for skilled labor; industries that can use certain raw materials found in Florida.

The primary factor in any of these three general cases is: "Does the proper business opportunity exist in the area?"

12. YASEEN

Experience, objectivity, and anonymity are most important . . .

In any decision where millions of dollars are involved, experience, objectivity, and anonymity are the most important factors in reaching a sound decision. "Do-it-yourself" techniques in locational matters are no more to be trusted than acting as your own doctor or attorney. Others have spent a lifetime preparing to help the manufacturer in this as well as in other specialized fields.

Turn the page

SUCCESSFUL PLANT SITE CHAIRMAN!

Cheops, Egyptian Pharaoh, was a bit of a stinker, but his organizational ability cannot be doubted. He decided to build a pyramid—the biggest. The site—Gizeh; materials—limestone locally quarried; labor force—100,000 men in three-month shifts. The market—himself.

The pyramid business has fallen off badly, but old Cheops' method of procedure still holds good. Deciding what is to be accomplished and orienting other factors to the efficient fulfillment of this need is logical. In plant site selection it is paramount.

When your industrial needs have been established, the Chicago and North Western Railway can be of the greatest assistance. With precise requirements in mind, experienced staff members match your specifications to the facts concerning locations. If the facts are lacking, we'll find the answers. Result: site recommendations keyed to your company's needs rather than a welter of "just-might-possibly-do" real estate parcels. This process saves effort, time, expense.

Are you looking for a plant site? If so, submit your requirements to us. Inquiries held in Sphinx-like confidence. Address: ***Gene F. Cermak, Industrial Development Department, Chicago and North Western Railway, 400 West Madison, Chicago, Illinois.***

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COMPANY

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SITE SELECTION ROUND-UP
Begins on page 180

Q. What are the most common mistakes?

1. ANDERSON

Poor selection of the communities to query . . .

One very common mistake is to select a list of communities and send each of them a long, detailed questionnaire. We have taken over on several surveys where the client started in this fashion, and in every case we found a superior site that was not located in any community on the client's list. Obviously, these final sites would not have been uncovered by the original approach.

2. BISHA

Not getting enough land and information . . .

Some common mistakes are: not getting enough acreage for present and future needs; unawareness of flooding possibilities; failure to get foundation borings; failure to check with the railroad to see whether sidings can be installed economically or at all; failure to check zoning. Many building permits are denied because of non-compliance.

3. BLAKELEY

Choosing the cheapest piece of land . . .

Unquestionably, the most common mistake is the erroneous concept that a cheap piece of land makes the least expensive plant site. But raw land is just the beginning. We often spend over six times that cost in developing a usable site. Sewer, water, power, gas, and access roads, for instance, often cost more than the land. And proper zoning—not just any zoning—must be provided. Same for assembling the parcels, and gaining clear title.

4. BUSSE

Mixing personal with economic reasons . . .

I believe the most common mistakes made are by executives who let personal convenience influence sound economic reasons for the ultimate location of their plants.

5. CARY

Failure to screen prospective employees thoroughly . . .

A mistake that's closely allied with plant location—although somewhat after the fact—is failure on the part of the incoming industry to screen their hourly employees closely during the initial hiring. A local committee should be used to weed out the undesirables.

6. COATES

Over-acceptance of community selling points . . .

Be cautious about sizing up the attitude of your prospective community. A company must make money in order to live. If it doesn't—partly or wholly because of a poor site decision—both the company and the community that has oversold its attributes will be hurt because the plant will either move out or simply remain and decline.

Turn the page

SINCE World War II, industrial expansion has been 43% greater in Kentucky than in the Nation as a whole. Machinery manufacturing is up 601.5%—chemicals up 317.8% — electrical machinery manufacturing up 411.1%. Total Kentucky manufacturing is up 135.1% as compared with 94.5% for the United States. (Source: U.S. Dept. of Commerce.)

And Kentucky's growth over the next decade will unquestionably dwarf all past records. Why? Because hundreds of companies have discovered that Kentucky offers maximum opportunity for progress and profits, through its unique *combination* of advantages: its central location *between* the North, East and South; its tremendous pool of responsible, easily-trained people who are *eager to work;* its tremendous water supplies, including more miles of navigable streams than any other state in the Nation; its great reserves of electric power; its rich deposits of minerals such as coal, oil and clays; its enormous agricultural, timbering and woodworking resources; its own surging demand for machines, equipment, supplies. Kentucky is the Nation's newest industrial opportunity, aware of its traditions but *working* for the promise of the future.

Government and Industry Join To INVITE You To Kentucky . . . To SHOW You Why You Should Move Here . . . To HELP You When You Arrive!

The industrial departments of leading utilities, railroads and the Kentucky Chamber of Commerce have pooled their individual facilities to work in closest co-operation with each other and with the Kentucky Department of Economic Development. This "Kentucky Team," can provide you with all the data you need to analyze your opportunities in Kentucky. The private members do not push their own companies' interests unless those interests coincide with your own.

This "Kentucky Team" is unusually competent and effective. Give us an outline of your requirements, and let us *show* you what we can and *will* do for you. *Address:*
Lt. Gov. Wilson W. Wyatt, or E. B. Kennedy, *Commissioner*
Dept. of Economic Development,
500 State Capitol Building, Frankfort, Kentucky

COMMONWEALTH OF KENTUCKY

The CENTER of INDUSTRIAL AMERICA

At the request of Governor Bert Combs, Lt. Governor Wilson W. Wyatt (nationally-known lawyer, and National Housing Expediter after World War II) devotes his full authority to Kentucky's industrial development.

A tremendous new program has been set up to supplement all standard development procedures. Every branch of State Government is involved, and the program is backed by hundreds of private organizations. Tax legislation favorable to industry . . . a new 3% sales tax to finance better schools, roads and other improvements . . . state authority for building airstrips, and access roads to plant sites . . . an Industrial Development Finance Authority, recently upheld by the Court of Appeals, to aid local industrial development projects . . . these and many other great forward strides *have been made* or are now on the threshold of accomplishment. *Big things are happening in Kentucky.* Write for full details!

WEST VIRGINIA

LOCATION — West Virginia is in the center of expanding opportunities — within 500 miles of 50% of the nation's population. Quick access to raw materials and to markets — these are among West Virginia's advantages.

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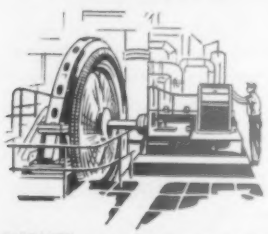

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For information write Don Crislip, Executive Director, West Virginia Industrial and Publicity Commission, State Capitol, Room F, Charleston 5, West Virginia.

INVESTIGATE

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190 Circle 764 on Reader Service Card

SITE SELECTION ROUND-UP

Begins on page 180

7. FINNEY

Contacting too many I. D. sources . . .

Some seekers contact too many and too diverse industrial development sources, rather than choose one competent agency through whom to conduct their initial investigations. And some people think of the theoretical desirability of many sites instead of the elimination and selection of a few for concentrated study. They lose much valuable time and energy. If the seeker really knew what his two or three major location factors were, then he wouldn't have to spend so much time winnowing out from many agencies, towns, and sites.

8. FRAKER

Acting without adequate information . . .

The most common mistake in making a plant site selection is making the decision without adequate information.

9. JENSEN

Insufficient evaluation by the company . . .

Frequently, there's insufficient research and survey of needs on the part of the site-seeking company itself. After all, they are the most qualified to know their needs. An important index of the lack of management planning—and incorrect site selection is a factor here—is the monthly list of business failures published by Dun and Bradstreet.

10. TARR

Failure to consider transportation alternates . . .

Frequently people neglect to consider the wisdom of choosing sites that are serviced by more than one means of transportation. Having alternates available helps keep transportation costs down. And alternates give you flexibility in planning for new products or expansion that might be hindered by lack of adequate transportation facilities.

11. WOOD

Not getting enough land . . .

We consider the most common mistake is failure to acquire enough property for future expansion. Another mistake is failure to analyze transportation costs properly. The geographic center of a market area is not always ideal from the standpoint of transportation costs.

12. YASEEN

Over-optimism about package deals . . .

The tremendous increase of industrial parks and "package deals" poses many problems. Sure, there are tempting advantages, such as a "turn-key" job, ready-made zoning and improved land. But don't be tempted without looking into some of the negative aspects. Industries often find strikes and labor problems are contagious. Sometimes there is vehicular congestion at the beginning and end of the day. And developers usually insist on a high ratio of land coverage, especially in metropolitan areas, which limits expansion.

Turn the page

information about

Rock Island Country

for industrial site seekers

When you plan a new factory, warehouse, or other industrial installation, you want it to be in a stable market with a steady rate of expansion and an uninterrupted supply of men and materials to manufacture and move your product.

This describes Rock Island Country, the heartland of America. It is the center of national markets and the headquarters of many important regions. All across this great territory, the Rock Island railroad has choice industrial sites available. And it has specialists who can provide you with all the essential information about the areas these industrial sites are in—facts on labor, transportation, power, raw materials, housing, the community, commercial services, and a host of other details.

From Chicago to Des Moines to Denver...from the Twin Cities to Kansas City to Houston...from Little Rock to Amarillo—Rock Island Country is thriving, and is destined to get even more vigorous. If you would like to have your company become a part of this vast industrial growth, let one of our industrial specialists help you. They are located in all key areas, and know them intimately. They are the people who have helped locate over a billion dollars of private industry in Rock Island Country in the past three years.

For the name of the man in the area that interests you, write, wire, or phone P. J. Schmidt, Manager, Industrial Department 141, Rock Island Lines, La Salle Station, Chicago 5.

Rock Island

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CHICAGO 5

For more facts Circle 765 on Reader Service Card

SERVICE

- TO BIG BUSINESS
- TO SMALL BUSINESS

Big Business likes Haverhill's receptive spirit so says Chas. B. Stauffacher, Executive Vice President of Continental Can Corp. on his announcement of his plant expansion in Haverhill. He cited its skilled labor supply, favorable community characteristics, municipal facilities and amicable labor relations as key services offered for his company's growth in our community.

Small Business growth is exemplified through the Haverhill Industrial Council's aid to the Gare Ceramic Supply Company. Special financial assistance and extensions of local municipal facilities were vital services that helped this small company expand into new plant facilities to build national recognition in merchandising their Symphony brand of ceramic supplies.

. . . . . .

Other companies who have doubled their production in the Haverhill area who will attest to our services are:— **Big Business — Western Electric. Small Business — Western Products.**

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We offer a unique financing presentation service that lets you realize maximum flexibility in planning your financial needs. Our contacts with Commercial Banks, Investment Bankers, State & Local Foundations, Industrial Trusts, Insurance Companies, Private Developers, Leasing Companies, Small Business Administration, and Small Business Investment Companies may help you.

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OUR ASSETS

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We offer superior skilled labor, excellent industrial climate, choice plant sites, harmonious community living, unexcelled labor-management relations.

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☐ **Available Property List**

HAVERHILL INDUSTRIAL COUNCIL
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Haverhill, Mass.

Tel. DRake 5-5689

SITE SELECTION ROUND-UP

Begins on page 180

Q. What's the greatest contribution you professionals can—and should—make in the next five years?

1. ANDERSON

Teach communities the importance of proper zoning . . .

Communities need to know the importance of providing desirable tracts for industrial development. These should possess basic services, should be protected by proper zoning from haphazard encroachment.

2. BISHA

Encourage more intelligent industrial zoning . . .

We in industrial development should encourage wider and more intelligent use of industrial zoning to preserve land for future development. This is a critical problem for all communities, large and small. And we must urge adoption of performance standards in zoning practice, to obtain wider utilization of available properties.

3. BLAKELEY

Create attractive industrial properties . . .

We have a responsibility to create the type of facility that will be a long-term credit to the community; one that will add to the attractiveness of the area, will increase real estate values, and won't deteriorate into some of the industrial slums we see in our cities today.

4. BUSSE

Strive for national understanding of benefits of industrialization . . .

Helping to understand and to define the function of the urban center—the true pivot of American strength—is a job for every industrial developer. The city remains the core of American industry, but misuse of land is prohibiting maximum use of this urban industrial potential. For America to grow, we've got to find solutions to problems of urban taxation, transportation, and redevelopment.

5. CARY

Help match industries to towns . . .

One of the most important contributions that industrial developers can make is to match suitably the right town and the right industry. We can make industry's job easier by making our specialized and local knowledge more readily available to them.

6. COATES

Campaign for tax reductions to encourage research and development . . .

We know that population, wages, and taxes will rise in the next five years. We also know that our salvation is to stimulate new ideas, new processes, and new products. But for that stimulation, more money must be permitted to flow back into research projects. As industrial developers, it is up to us to campaign for lessening tax and legal restrictions on research and development.

Turn the page

ARE YOU UP TO DATE ON THE NATION'S NUMBER ONE PLANT SITE?

More than 16,000,000 people make New York State number one in *population*. More than $42,000,000,000 make New York State number one in *personal income*. More than 6,000,000 people in nonagricultural employment — and almost 2,000,000 in manufacturing employment — make New York State number one in *labor supply*. More than $16,000,000,000 make New York State number one in *value added by manufacture*. More than $21,000,000,000 make New York State number one in *retail sales*. More than $62,000,000,000 make New York State number one in *bank deposits*. All this is just a factual way of saying that New York State is the number one *site for your new plant*. Further information on FINANCING ... MARKETS ... AVAILABLE SITES ... RAW MATERIALS & COMPONENTS ... TRANSPORTATION ... TAXES ... POWER & FUEL ... COMMUNITY SERVICES ... HOUSING ... is yours FREE. Simply outline your specific needs and drop a line to Keith S. McHugh, N. Y. State Dept. of Commerce, Room 858 112 State St., Albany 7, N. Y. You'll also receive our free booklet, "Industrial Location Services."

NEW YORK STATE
DEPARTMENT OF COMMERCE

For more facts Circle 767 on Reader Service Card

Expansion Capital For Growing Companies

If limited capital is delaying your expansion program, investigate Rhode Island's unique 100% Financing Plan. Under the provisions of this liberal plan, you can have that new manufacturing plant immediately, without delay, without investing needed capital.

It is not necessary to be in the top 50 companies in the U.S.A. to qualify for Rhode Island's 100% Lease-Purchase Financing Plan. If your company is well managed and has a sound future, you'll be welcome in Rhode Island.

A number of newly constructed buildings are available to you in well planned industrial parks. Others are being built. If you require special facilities, we will build a new plant to your specifications.

For complete details on Rhode Island's 100% Financing Plan, plus full information on Rhode Island's business climate and economic advantages, write or phone:

Adolph T. Schmidt
Executive Director

RHODE ISLAND DEVELOPMENT COUNCIL

110 Roger Williams Building, Hayes Street
Providence, Rhode Island
JAckson 1-7100

SITE SELECTION ROUND-UP
Begins on page 180

7. FINNEY

Establish confidence in the industrial development profession . . .

No two plant location problems can be answered in the same way; each must be tailored to fit, and there never will be complete formalization. Therefore, competency and integrity of the industrial developer becomes increasingly important. Let us in the profession strive to establish confidence on the part of the prospect that our service will be complete, factual, and coordinated. And site selection will accordingly become more effective, economical, and accurate.

8. FRAKER

Establish performance standards . . .

The greatest contribution that the professional can make is to upgrade himself and to assist in the comparable development of others in our field. Even the simple establishment of formal standards of performance in the field would be helpful.

9. JENSEN

Become more knowledgeable . . .

We must know more about industry's requirements—its physical plant as well as its product. Our information to prospects must be dependable and defensible, not embellished. We must work toward an *area* program rather than for a single community. Community benefits are wide, really; put the industry where it is best suited, and don't try to grab it if it's not suitable. Strive to drive home to the community: "Keep your house in order, to help attract prospects."

10. TARR

Help communities to know what they need, and what is available . . .

Establish and publish realistic criteria for local communities that want industry, so they can know what they really want, and what is practical for them to get.

11. WOOD

Raise professional standards; establish a directory of sources . . .

Our profession should raise its standards. Through improved service to industrial prospects, we'll gain greater recognition. In five years' time, an industry seeking a new location should be able to consult a directory of industrial developers and select one from which it could be assured of finding all the assistance necessary.

12. YASEEN

Eliminate "filler" from presentations . . .

Many state agencies, chambers of commerce, railroads, and power companies are making a sincere effort to be helpful to industry. Yet manufacturers must still wade through mountains of generalities. The greatest contribution that industrial development people can make is to strip away time-consuming "filler" and to provide technical information for specific industry needs.

A PLANT LIKE THIS CAN BE YOURS!

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NORTHERN BERKSHIRE DEVELOPMENT CORP.

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In its first full year of operation the Maine labor force of one of our new industries *out-produced the former force by 30%!*

It's a happy crew of people working in a new building built at a *savings of $2.00 per square foot.*

It's an industry using Maine's unique financing program that provides *up to 100%* of the cost of all new construction.

The key executives are happy, too. Wouldn't you be? More production, lower costs, adequate financing facilities and a home in MAINE — *The State of Better Living.*

SEND FOR MAINE'S DO-IT-YOURSELF KIT

Contains 4-page check list of industrial plant location data that will enable you to list your primary requirements in a matter of minutes; the Maine story in a 24-page news supplement; area fact books; and a complete description *of Maine's 100% financing plan for new construction.*

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Lloyd K. Allen, Commissioner
Maine Department of Economic Development
State Capitol Augusta, Maine
In N.Y.C. Telephone Columbus 5-2460

For more facts Circle 771 on Reader Service Card

Family Playground, Virginia Beach, Va.

Minutes from Your New Plant in Tidewater Virginia

Industry really lives in Tidewater Virginia where unlimited recreational opportunities are available to all executives and production employees. Within minutes of plant or home, Tidewater has the outdoor facilities and activities which assure the stability and morale of plant personnel. And living costs are low comparatively . . . housing is plentiful with excellent selection . . . all of this in a friendly climate among friendly people.

There are other important considerations for industry in Tidewater. Unequaled Hampton Roads deep water terminals . . . transportation and trunkline railroads . . . abundant labor, fuel, power . . . all within immediate access to leading consumer and industrial markets. An expanding, confident business climate assures company prosperity.

For a confidential report, obligation-and cost-free, researched to your company's exacting specifications, please contact:

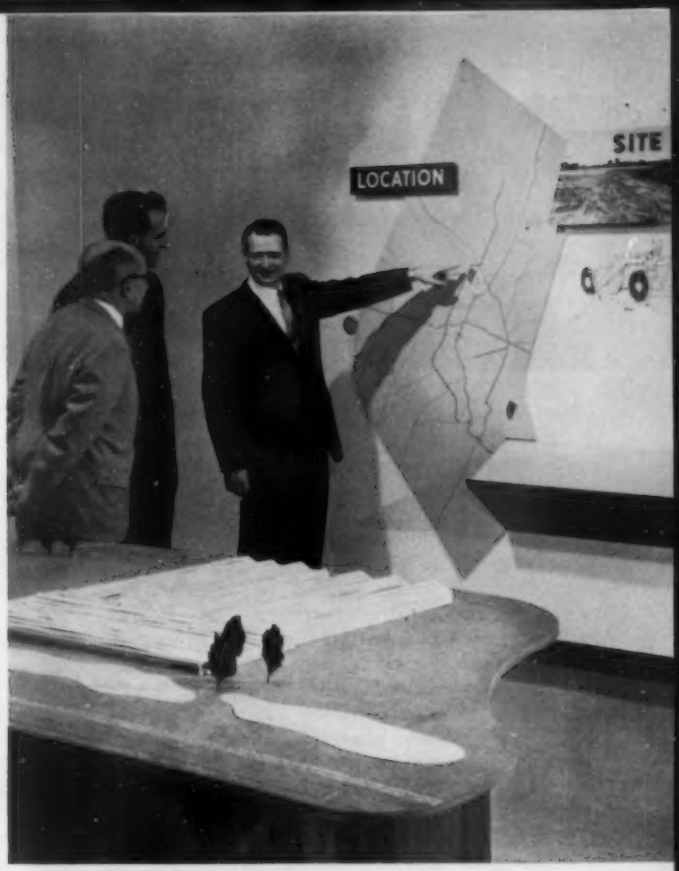
Clarence H. Osthagen
Vice President & Executive Director

Tidewater Virginia Development Council

300 Boush Street, Norfolk, Va.

Officially representing the cities and towns of Boykins, Branchville, Franklin, Norfolk, Portsmouth, Smithfield, South Norfolk, Suffolk, Virginia Beach, Wakefield and Windsor; the counties of Accomack, Isle of Wight, Nansemond, Norfolk, Northampton, Princess Anne and Southampton.

For more facts Circle 772 on Reader Service Card



Flick-Reedy managers are justifiably proud of their site selection efforts. Result: this attractive display in plant's exhibit room.

TOP PLANTS OF 1960

SITE SELECTION—

Tough Tests for Towns and Terrain

Ten exciting stories with happy endings. That sums up the experience of this year's top plants during the early—and critical—site selection phase of new plant planning. Each plant, beset with problems unique to its operation, product, and pocketbook, called on ingenuity and intelligence to find a suitable solution. Big and small (G-V Controls, 300 employees; Western Electric, 5000), far and near (Tijeras, N. M., to Livingston, N. J.), the top plants applied these three cardinal principles of good plant location:

1. Determine the plant's needs.
2. Get all the facts.
3. Decide by engineering methods, not personal taste.

Here's a quick recap of each plant's location problem and solution. Chances are, you'll find similar problems next time your company has a plant location decision.

The site across the road seemed like the wrong solution for Brunswick-Balke-Collender.

Problem: Get into a structure quickly and get the subcontracted automatic pinsetter business under its own roof. Explore existing buildings, reach a solution rapidly, keep up with rising product demand.

Solution: If anyone thinks that plant location lacks drama, they're wrong. And Brunswick's decision to remain in Muskegon, Mich., proves the point.

For its proposed Automatic Pinsetter Division plant, Brunswick reluctantly ruled out the logical site across the street from its 50-year-old plant complex. The reasons: The site was too small. Access would be difficult across the busy six-lane street. The state had already purchased part of the property and razed a filling station in preparation for a cloverleaf intersection on a proposed new highway.

Working with the plant location group of Cunningham-Limp (designers-engineers-builders), Brunswick explored properties in Michigan and nearby states.

Then civic leaders of Muskegon learned about the plans to go elsewhere. With split-second timing, they gathered forces and talent and money. Asking for a few days' delay in Brunswick's final decision, they presented a package of 13 items to offset the company's reasons to relocate. Topping the list, were funds they had raised to purchase property, raze a string of old houses, and build a tunnel under the street. By quick sleuthing, they learned that the state had just decided to build the proposed cloverleaf further away.

The two unions in Brunswick's Muskegon plant agreed to extend their contracts for two years, and the construction trades hastened to go on record with a statement of intent to do everything in their means to eliminate work stoppages during construction.

Drama? Plenty. And Brunswick stayed in Muskegon.

Long-range transportation costs topped Chrysler's list of plant location considerations.

Problem: Replace two 30-year-old automobile plants in Evansville, Ind. Consider transportation costs to the expanding automobile market in the South-Central and Southwest areas of the U. S.

Turn the page

. . . PLANT SITE SELECTION

Solution: Here's what Chrysler says about plant location, in a speech by Executive Vice President William C. Newberg to the St. Louis Chamber of Commerce:

"We were looking for a place with an adequate water supply, plenty of low-cost power, and nearness to a big city. We wanted large numbers of people and skills, and a variety of industrial suppliers to draw upon. We needed easy access to railroads, highways, and waterways. If possible, we wanted to be near a good source of coal. But above all, we needed the right location in relation to our markets.

"We worked our electronic computers overtime answering questions about the best location. And no matter what questions we fed into those machines, the same answer always came out—St. Louis."

Chrysler's new location—Fenton, 20 miles southwest of downtown St. Louis—helped the company adopt a revolutionary new method of automobile transport—by piggyback (photo, page 92).

Flick-Reedy found just the right site in a rural area near Chicago, but still needed community acceptance.

Problem: Flick-Reedy had outgrown its old plant in Melrose Park, a western suburb of Chicago. Farming country a few miles out looked good, except for water supply and sewage disposal. Employees would not be lost in the move. And there was room for expansion. But the proposed community of Bensenville was lukewarm to industry, and had even turned down one nationally known firm that had hoped to locate there.

Solution: Key Flick-Reedy people made personal calls on townspeople to acquaint them with the true picture of modern industry—and of Flick-Reedy specifically. Fears of water shortage due to overtaxing an inadequate municipal system were allayed by water conservation plans (page 94). Officials let the community know there would be no boiler room, no smokestack, and no water tower.

The clincher came with invitations to an open-house at the old plant. Over 300 people came, saw, and were conquered. Later, at a public hearing, Flick-Reedy's admission to Bensenville was assured.

G-V Controls wanted to save its work force, yet have plenty of room "out in the country."

Problem: How to move out of six small rented buildings, build a new plant, but save the plant work force.

G-V Controls was growing fast in its East Orange, N. J., location. After expanding into one small rented building after another, the company was occupying six altogether. Administrative problems were difficult for such a scattered operation. And space was tight. Then, along came plans for a new highway to cut through the buildings, and a move became inevitable.

Solution: G-V Controls wanted to be far enough away from the city to get space for present and future needs, yet close enough to keep most of its carefully trained teams of light bench workers. The company asked an industrial realtor to make recommendations.

There isn't much space left within easy driving distance of East Orange—at least, not for industry. So the first step was to find an established building. Several buildings were examined, and quickly discarded because they were too small or didn't permit expansion.

The realtor finally spotted an ideal site for the plant's needs: 14 pleasant acres (5 or 10 was the target) just 10 miles away in the small town of Livingston. What's more, the site was in a horseshoe bend of the small Passaic River. After the underbrush had been cleared out along the river's edge, there was an attractive view.

When the move was finally made a year later, just one employee quit. G-V Controls achieved its goal of retaining its main resource—people.

Because of transportation costs, Ideal Cement needed to locate close to markets—and to raw materials.

Problem: It costs money to ship the raw materials for manufacturing cement. And it costs about as much to ship the final product. Therefore, Ideal's problem was to find a location close to supply—and customers.

Solution: Ideal had been shipping cement into New Mexico for many years from a plant in Portland, Colo. The company's exploration department teamed up with the business research department to survey the shipping and market picture. Tijeras, N. M., just a few miles east of Albuquerque, proved to be the point where supply and demand most economically met.

At Tijeras, a geological survey (some years ago) had located a supply of limestone, and land was purchased at that time as a long-range investment. Additional land was now purchased—enough for quarrying operations well into the future. The plant site is adjacent to the quarry.

From the new plant site, excellent roads branch out into all parts of New Mexico and neighboring states. The rail head at Albuquerque is fairly close, but local traffic there slows down the transfer trucks. To meet this problem, Ideal set up a rail shipping point at a terminal of another rail spur 22 miles away in the opposite direction from Albuquerque.

Turn the page

Schenectady has GUTS*

PLEDGE CARDS from over 10,000 determined members of the Schenectady area illustrate the desire and enthusiasm of a progressive-minded citizenry working together to bring new business to the community.

Schenectady County is a New York State industrial and research community of 150,000 people—people drawn from all walks of life; science, labor, management, education, clergy, government and industry. These 150,000 people have dedicated themselves to making existing businesses so outstandingly effective, that they will capture a share of America's growing industrial and commercial market.

They are 150,000 People with a Purpose.

Schenectady, New York is a community which is anxious to prove it will do everything necessary to deserve the businesses and new jobs which will permit it to prosper and expand. As an industrial leader, you know your success depends not only on technology or location, but on the people who *are* your business —skilled, intelligent employees who are enthusiastic about their jobs and dedicated to their community—*people with a purpose.*

You will find this attitude a basic part of Schenectady. Along with the human skills you need, you will also find all of the educational, cultural, social and recreational facilities necessary to establish a successful and profitable business. And, of course, you will find all of the physical requirements to establish and sustain every type of business:

- *Ample Water and Utilities*
- *Air, Rail, Truck, Sea Transportation*
- *Available Risk Capital*

If you are considering a plant expansion program, write today for "People with a Purpose"—a brochure packed with the facts and feelings that make Schenectady, New York the ideal plant-site for profit-conscious companies such as yours.

GUTS, Inc.
P.O. Box One, Schenectady, N. Y.

Please send me your brochure describing the people and facilities in Schenectady, New York that will help me make my decision on plant expansion.

Name_____

Street_____

City_____ State_____

Firm_____

G*ear Up for Tomorrow in Schenectady

For more facts Circle 773 on Reader Service Card

. . . PLANT SITE SELECTION

Kennecott wanted to build on the East Coast. Needed good docks, rail facilities, water, labor, and markets.

Problem: Kennecott wanted to establish an Eastern Refinery along the seaboard somewhere between Baltimore and Port Newark, at a location where copper "blister" could be received by freighter, and refined copper shipped to Eastern markets by rail and truck.

Solution: Twenty-five potential sites were first drawn up as possibilities. Comprehensive data for each were gathered, and visits made to each.

When the final sharp-pencil chores were over, the selected location was on the Patapsco River, just south of Baltimore, in Anne Arundel County. A mile away, a new pier of the Maryland Port Authority handles the cargoes of ocean freighters. A spur of the Baltimore and Ohio Railroad serves most of the plant's transportation needs. Trucks take care of nearby customers.

A somewhat unexpected dividend of the Kennecott site was that the soil conditions proved to be so excellent that no pilings were necessary for the heavy furnaces and the electrolytic tanks of the refinery process.

Royal McBee needed a good spot for future markets, a trainable labor supply, a receptive community.

Problem: For its rapidly expanding line of portable typewriters, Royal McBee's main plant at Hartford, Conn., was overcrowded and inefficient.

Solution: Fantus Factory Locating Service was engaged to handle the bulk of the survey and pre-selection groundwork. Four cities were presented for Royal McBee's final review and selection. Springfield, Mo., won out, based on good transportation and other factors significant to the company.

Springfield is near the projected heart of the portable typewriter market, and the background of labor-management relations was good. The community climate, in addition to the labor picture, measured up well.

Screw and Bolt Corporation of America wanted out of its crowded city area, but wanted to stay near Pittsburgh.

Problem: Three old multi-story plants in different parts of Pittsburgh were inefficient for manufacturing, material handling, and administration. Company management wanted to stay in the area, yet have all the most desirable new site factors.

Solution: The Austin Company was engaged to make a plant location survey. Within a stipulated 50-mile radius of Pittsburgh, six or eight possibilities were found that met the basic requirements.

Screw and Bolt narrowed down six Austin recommendations to one at Mount Pleasant, took an option on the property and made test borings. Water supply was checked, found to be OK when used in conjunction with a recirculating system for cooling water. And there's a guarantee from the water company for at least twice the initial needs, even if newcomers move into the vicinity.

Labor supply was more than adequate, since Mount Pleasant is part of an old coal-mining district. In addition, the location is near enough to Pittsburgh via the Pennsylvania Turnpike and other good highways that most of the initial work force came from the old plants.

Good labor climate and adequate transportation headed the list for Dayco Corporation's Springday Company.

Problem: In a highly competitive market like V-belts, the best possible conditions of good labor relations and good labor rates were most important.

Solution: Springfield, Mo., has the right labor climate. It also has good rail and highway transportation facilities that lead quickly to and from a large part of the country. And there's pleasant living. The many lakes of the Ozarks are but a short drive from Springfield. (The boat industry is thriving.)

And that's where Dayco built its new division—the Springday Company—right in the town. Company officials were so pleased with Springfield they used the "Spring" in "Springfield" as the first syllable of the name given the new plant.

Western Electric wanted the right headquarters area—and a topnotch manufacturing location.

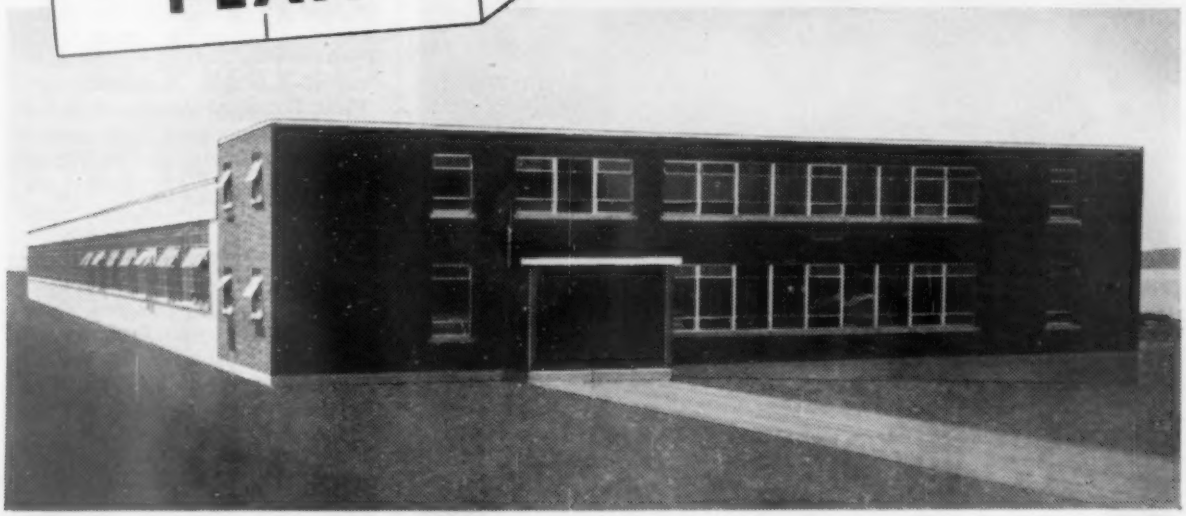
Problem: Western Electric's overriding aim was to provide an engineering headquarters for the design of tomorrow's electronic switching systems.

Solution: A team from Western Electric made an extensive survey of the Central area of the United States. They found Columbus, Ohio, had 10 advantages:

1. An adequate supply of skilled labor.
2. A good transportation network.
3. Ready access to raw materials.
4. A good location as a distribution center.
5. A highly receptive community climate.
6. Necessary services: water, sewage, power, rail.
7. Favorable topography.
8. An equitable tax climate for industry.
9. Good schools, universities, social, recreational and religious provisions.
10. Favorable experience of similar manufacturer.

A
PACKAGE PLAN

FOR INDUSTRIALISTS CONSIDERING PLANT RELOCATION



40,000 Sq. Ft. — Ready For Immediate Occupancy

Financial arrangements are available to qualified manufacturers whereby your present plant will be paid for in cash to facilitate the lease or purchase of the brand new, 40,000 Sq. Ft. industrial plant shown above. Located on approximately 7 acres of land overlooking beautiful Mount Hope Bay — it is adjacent to Fall River's Minneapolis-Honeywell plant to which a 55,000 Sq. Ft. addition is now being constructed.

Plant facilities include adequate office space, 32,000 Sq. Ft. of clear manufacturing space with a 16 Ft. ceiling height. Completely lighted and sprinklered with all utilities available — electricity, gas, water and sewer. 200 car parking area.

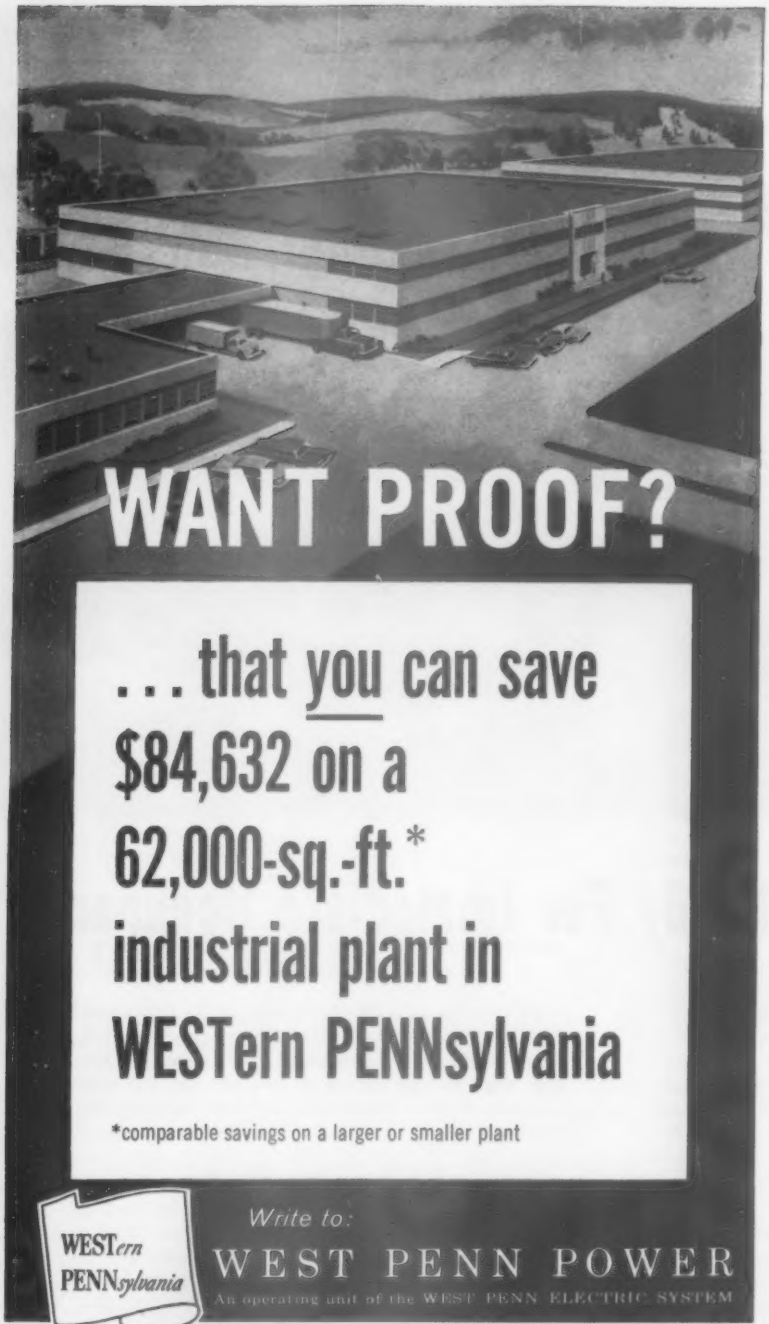
Its location is within minutes of the Fall River-Boston 6-Lane Expressway that connects with U.S. Route 128 and the Massachusetts Turnpike. It is also within easy access of Route 195, the 100-Million Dollar Federal Highway now under construction.

The area is beautifully landscaped . . . zoned exclusively for industry . . . enclosed by a chain link fence and the entire property can be purchased or rented on a gross form of lease. Rental includes local real estate tax, insurance on building together with outside maintenance of building — Brokers protected.

Write for Free Brochure on your Business Letterhead. It will provide you with detailed information on Fall River's Industrial Building Program, Space Availabilities, Labor Supply, Community, Educational and Recreational Facilities.

FALL RIVER INDUSTRIAL COMMISSION

142 Second Street, Fall River, Mass. OSborne 2-6969 — Wallace A. Walker, Director



WEST PENN POWER, Area Development Dept. F-23
Greensburg, Pa., Phone: TEmple 7-3000

Yes, I'd like to have proof of the savings possible on industrial plant space in WESTern PENNsylvania!

Name_____ Title_____

Company_____

Address_____ Telephone_____

City_____ Zone____ State_____

Plant Site Catalogs

For more about these items, circle item numbers on Reader Service Card next to back cover.

Regular Catalog News section starts on page 308.

1—Across the Nation. Helpful publications include the following: "Plant Location Services of Office of Area Development," "Organized Industrial Districts," and bibliographies of published literature on site selection. *U. S. Dept. of Commerce.*

2—East Central. Handsome booklet (12 pages) tells how schoolboy, farmer, and others influence plant-site selection. Equally handsome is foldout (12 pages), "Power and Natural Resources Map." *American Electric Power Service Corp.*

3—Pennsylvania-New Jersey. Surveys of over 50 individual areas (e.g., York, Pa.) list resources, neighbors, and aids to industry in region served by four electric utilities. Other booklets tell how to set up and promote area development. *General Public Utilities.*

4—Idaho. Sixteen jumbo-size pages with stunning photos dramatize Idaho's resources for industry: hydroelectric power, ample water, timber, minerals, fuels, recreation facilities. *Idaho State Dept. of Conservation & Development.*

5—Illinois. Series entitled "Atlas of Illinois Resources" is now being developed. Section 1, "Water Resources and Climate," and Section 2, "Mineral Resources," now available, run to 60 pages each, with color maps and complete details. *State of Illinois.*

6—Michigan. Mimeographed sheets list and describe buildings available now: location, size, construction material, acreage, transportation. Breakdown by Upper and Lower Peninsula, and by county. Reissued semi-annually. *Michigan Economic Development Dept.*

Turn the page

SITE SEEING?

Get award-winning book telling of

424 *Industrial* **SITES**

now available in Marvelous

Minn-esota!

Site-see Minnesota from your desk! New 112-page fact book lists 123 Minnesota cities with latest industrial facts and available sites—plus name of local contact.

WRITE: On your firm's letterhead for free industrial site book, "Minnesota Welcomes New Industry"

Dept. of Business Development, State Capitol, Dept. 450, St. Paul, 1, Minnesota

Circle 776 on Reader Service Card

IF You Change Your Address

please be sure to let us know promptly. It takes time to correct the stencil addressing plate. And we don't want you to miss copies of FACTORY.

EASY, quick way to tell us . . . use the Reader Service Card opposite the back cover. Be sure to give us both your *old* address and your *new* address, including your postal zone number. Drop the card in the mail and we'll make the change as quickly as possible.

FACTORY

330 WEST 42ND ST.,
NEW YORK 36, N. Y.

Attractive, Level, Flood-Free Land Close to Metropolitan Markets of Pittsburgh, Cleveland and Buffalo

This adaptable 750 acre plant site is ideally located adjacent to Greenville, Pa., and is only 80 miles from Pittsburgh and Cleveland; only 150 miles from Buffalo. Next day rail delivery to these points.

Extensive deposits of coal, limestone, clay and aggregates nearby. Steel and other basic materials available with 24-hour delivery service.

Investigate today! Write or phone for *location factors* of this site.

BESSEMER and LAKE ERIE RAILROAD CO.

INDUSTRIAL DEVELOPMENT DEPARTMENT

1628 FRICK BUILDING • PITTSBURGH 30, PA. • ATLANTIC 1-4780

The Bessemer Man is at your "Site Service"

For more facts Circle 942 on Reader Service Card

Plant Site Selection Guide

An evaluation tool to help you check hundreds of site factors . . . some you might not otherwise think about. Now available from FACTORY for only 35¢.

What it is—This guide to plant site selection is really two things:

. . . *A comprehensive listing* of factors that you *must* consider in selecting any plant site.

. . . *A simple but effective evaluation* plan that you can use to keep your eye on the factors that are most important to you, and to weigh them intelligently in making your final decisions.

How to use—The first step involves lots of soul-searching on your part. That's because *you have to decide what you need* before you can evaluate any site. And, just in case this sounds pretty elementary, let FACTORY's editors remind you that *failure to define needs properly is the single biggest cause of trouble in plant site selection.*

How do you define what's important? Simply turn to the columns of questions listed in the Plant Site Selection Guide. Every question is followed by two boxes, one headed "Importance" and the other "Site." Like this:

	IMPORTANCE	SITE
Are raw material sources available?	☐	☐

First step is to fill out that *Importance* box properly. Easiest way is simply to put a check mark in every box where a favorable answer to the accompanying question is important to you. Thus you'd check the question above on raw materials, if you *must* have reliable sources nearby. If that's not important, you'd skip it.

That's the simplest way to define your needs. Actually you can develop much more refined methods if you wish — tailor-made to suit your own problems. For example, you can have two or more classes of importance, such as "Imperative" and "Desirable." Or you can go even further and develop a numerical or alphabetical rating scale, evaluating the importance of every item in the Guide. For instance, you can have a scale ranging from 1 to 10, or you can use an A, B, C, D system.

You may even use two different approaches, one for preliminary evaluations which would be very simple (such as check marks), and one more complex (such as numerical evaluations) for your final rundown on the best one or two sites. The important thing is to use the approach that is most natural and easiest for you.

What about the site? Well, that's easy, once the importance of factors has been settled. Now you fill in the "Site" boxes to see how well they fit what you consider important. On the really critical items, you *must* have a very good match. Naturally, on items you haven't checked as important at all, you won't need to evaluate the site. That's the advantage of setting down your needs first. You don't waste time evaluating unimportant factors.

How to get the Guide—the Plant Site Selection Guide is really an insurance policy. Cost: 35¢. Possible payoff: the thousands and thousands of dollars saved when you choose the *right* site.

Get this six-page site selection tool now. Use the coupon below. And remember, *selecting a plant site is not a one-man job* . . . order enough copies for all your people who will be involved.

FACTORY
Reader Service Department
330 West 42nd Street
New York 36, New York

Send me ..... copies of the "Plant Site Selection Guide."

( ) Money herewith (35c each copy, postpaid)
( ) Bill me

NAME_____

COMPANY_____

ADDRESS_____

CITY_____ **ZONE** ____ **STATE**_____

Order with this coupon

PLANT SITE CATALOGS

Begins on page 202

For more about these items, circle item numbers on Reader Service Card next to back cover.

7—Upper Midwest. Aerial photos, maps, and listings of site resources mark this 16-page brochure about industrial development opportunities in St. Paul, Minn. Features a list of industries that would be neighbors of any new plant. *St. Paul Chamber of Commerce.*

8—Alabama. This 12-page booklet ("Alabama: A Digest of Corporate Taxes in the State") states clearly what taxes a corporation, foreign or domestic, may expect to pay on new and expanded industrial facilities. *Alabama Planning & Industrial Development Board.*

9—Georgia. Handsome loose-leaf (plastic ring binder) volume describes available plant sites throughout Georgia; gives aerial photo of each site plus detailed description and data on transportation, water, and other resources. Thumbnail maps. *Georgia Power Co.*

10—Missouri. Publications include "Missouri Fact Finder" (maps, statistics, tables—44 pages); "Comparative Tax Analysis" (64 pages); "Available Buildings" and "Available Industrial Tracts" (both mimeod, updated). *Div. of Resources and Development.*

11—New Mexico. This 36-page booklet, "100 Industrial Site Locations in New Mexico," gives a county-by-county list of available sites, with thumbnail description of each (acreage, transportation, power, price, agent). *New Mexico Dept. of Development.*

12—Shoreline, Mich. Jacket folder, printed in color, encloses loose-leaf pages describing (with aerial photos) available industrial plant sites along the shores of Lakes Michigan, Huron, and Erie. Pages are regularly updated, vary in number. *Consumers Power Co.*

13—Upstate New York. Booklets include a 28-pager, "Upstate, N. Y." (color pictures); "Upstate New York: Niagara Frontier" (16 pages

New Jersey has much to offer -

✔ The Electronic Industry

✔ The Food Processing Industry

✔ THE CONTAINER INDUSTRY

✔ The Electrical Equipment Industry

✔ The Pharmaceutical Industry

✔ THE PRINTING AND PUBLISHING INDUSTRY

✔ The Chemical Industry

Write for the report about the industry which interests you. Public Service Electric and Gas Co., Box Z, 80 Park Place, Newark 1, New Jersey.

For more facts Circle 943 on Reader Service Card

54

New Industries have moved into West-Central Ohio

Send for this booklet and learn their reasons

FRAM CORPORATION
says this about their Greenville Plant:
"Our new plant places us at the center of our market, and an adequate and productive labor supply. The fine cooperation of the people of Greenville favorably influenced our decision."

A. F. Pettet
Executive Vice President

Ask your secretary to send for this informative booklet which lists the reasons of all 54 firms.

THE DAYTON POWER AND LIGHT COMPANY
AREA DEVELOPMENT DEPT.
25 N. Main St., Dayton 1, Ohio

Send a free copy of "Why 54 New Industries Located in West-Central Ohio."

Name_____
Firm_____
Address_____
City_____ Zone___ State_____

PLANT SITE CATALOGS

Begins on page 202

For more about these items, circle item numbers on Reader Service Card next to back cover.

on Buffalo area); "Upstate New York: St. Lawrence Valley" (16 pages on Ogdensburg area). *Niagara Mohawk Power Corp.*

14—West Central Ohio. Booklet (16 pages) entitled "Why 54 New Industries Located in West-Central Ohio" shows photos of new plants, lists and classifies the area's 1313 industries, gives 10 reasons for locating there. *The Dayton Power & Light Co.*

15—Western Pennsylvania. Loose-leaf volume is a collection of data sheets from five counties between Pittsburgh and Lake Erie, plus consolidated statistics on taxes, transportation, population, employment, industries, and sites. *Bessemer & Lake Erie Railroad Co.*

16—East Rutherford, N. J. This 4-pager in color describes industrial park being developed close to New York City. Gives site-seekers data on railroads, highways, airports, labor, utilities, taxes. Offers financial and engineering services. *Industrial Parks, Inc.*

17—Greenfield, Mass. Loose-leaf 42-page book (mimeographed) tells story of small town as the right place for a new plant. Offers site-selection services, tells about labor market, taxes, utilities, transportation, etc. *Greenfield Chamber of Commerce.*

18—Lehigh County, Pa. Mimeographed 20-page brochure gives data on Allentown and Lehigh Valley area—population and labor pool, industries, transportation, utility rates, etc. *Industrial Development Corp. of Lehigh County.*

19—Haverhill, Mass. This 48-page booklet (3½x7½ in.), titled "Available Industrial Property," contains pull-out maps of industrial sites with full description of each. Also has photos of available buildings and facts about the area. *Haverhill Industrial Council.*

Turn to page 308

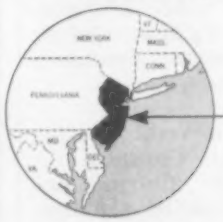
NEW JERSEY

...here's where the business is

A third of the nation's buying power will be within overnight delivery distance from your plant in New Jersey. There's no other place you could serve so many good customers so quickly and conveniently.

There are other good reasons why New Jersey is the right location for your new manufacturing or distribution facility. To help you find the right spot, the services of a staff of industrial location experts are available to you without cost and in complete confidence. Write for 40-page "New Jersey Industrial Guide".

NEW JERSEY
Bureau of Commerce, Section 951-A
Department of Conservation and Economic Development
520 East State Street
Trenton 25, New Jersey



in the geographic center of the world's richest market

For your next building . . . . . Color? Configuration? Single Wall? Sandwich Wall? Insulated Panels?

Your selection and procurement are simplified by investigation of EGSCO metal wall products. They comprise a complete range of sheet and panel configuration, a usable variety of baked-on, durable enamel colors, and a practical assortment of wall components in your choice of aluminum or steel.

EGSCO metal wall products are engineered for sound building construction with an economy attained through improved erection techniques, reducing erection time.

EGSCO metal wall quality and practicality have been built upon the experience of years in actual building design and erection. Thousands of EGSCO buildings from coast to coast attest these attributes.

Finally there is this plus: EGSCO erection crews have the experience and know-how to erect any of these wall combinations quickly, soundly and at a realistic cost, where this service is desired.

Here's how you can contact the nearest district office of Elwin G. Smith & Co., Inc., manufacturers of EGSCO metal wall products:

Boston	CEdar 5-1924
Chicago	KIngswood 3-3350
Cleveland	JAckson 6-4332
Detroit	Toledo, Ohio GReenwood 4-8198
New York	Clifton, N. J. PRescott 3-3313
Philadelphia	OLdfield 9-6655
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See these EGSCO products in Sweet's:

Architectural File:	Industrial Construction File:
Curtain walls 3a/Sm	Curtain walls 3a/Sm
Sandwich walls 8b/Smi	Sandwich walls 8b/Smi
Corrugated sheets 8b/Sm	Corrugated sheets 8b/Sm
Roof Deck 2c/Sm	Curved conveyor hoods 8b/Smt
Steel forms for concrete roof and floor slabs 2a/Sm	Roof Deck 2d/Sm
	Steel concrete forms 2b/Sm

Copies of these catalogs may be obtained from the nearest office of:

ELWIN G. SMITH & CO., INC.

Manufacturers of EGSCO® Metal Wall Products

Pittsburgh 2, Pa.

By PAUL A. KING, Member, New York Bar

Plant Rules Aren't Made to Be Broken

Can you afford *not* to enforce a plant rule? Can you make new rules stick without getting union agreement? Here are answers from two top arbitrators.

The awards in these two arbitration cases illustrate two major principles of rule-making.

The lesson to be learned from the first award is that the clearest plant rule will do you no good if not enforced. And once not enforced, you'll have to take some giant steps to make it stick thereafter. The lesson of the second case is that management can often set up new rules without getting union agreement to it first.

In both cases, management was tired of workers leaving the production line all day long. And in both cases it decided to stop the inefficient practice.

In the first place, there was a provision in the union contract which read: "Leaving the premises while on duty without permission of the supervisor is cause for discharge." But for years this company made no fuss at all about employees who left the production line without permission. And when it sought to discharge an errant employee, it settled for a lesser penalty than discharge.

Then one day an employee took off 25 minutes to visit the neighboring drug store and bumped into a supervisor on his way back. He was immediately fired!

Management, in presenting its case to the arbitrator, couldn't very well deny its past habits of lenience and laxity. But it did point out that this notice was posted on the third floor of its No. 9 Cutting Department: "The practice of quitting early, leaving the department without permission, visiting other departments, and leaving the plant during working hours has to be stopped." This was followed by a quote of the rule mentioned above. Then this warning appeared: THIS WILL BE STRICTLY ENFORCED.

Ordinarily one would believe that this notice would be sufficient warning to employees that the rule was thereafter going to be enforced and, therefore, that the penalty of discharge could be invoked with impunity. But that wasn't so as far as this particular employee was concerned. He had little occasion to be on the third floor where that notice was posted. Besides, he was not a member of the cutting department. He was an unclassified (roving assignment) employee. Furthermore, said the arbitrator, no evidence was introduced that he had, in fact, seen the notice.

As far as this employee was concerned, ruled the arbitrator, the company couldn't apply the discharge penalty. Said he, "By virtue of its own inaction over a period of many years, the company is responsible for having caused the employee in question to believe that he could leave the premises without permission and not incur a serious penalty, even if caught. In this context, the company is legally wrong to discharge the employee, since it had failed . . . to provide him with adequate notice that the agreement was to be enforced."

The company argued (without success) that when a contract clause is clear, you cannot resort to outside evidence to interpret it. With this the arbitrator agreed. But he explained that he wasn't using past practice to interpret a contract clause. He was merely applying reason to an established practice.

In the second case, heard by a different arbitrator, the company had allowed workers to take coffee breaks any time they wanted. An employee might step off the production line to take a break. Later on a second employee would do the same thing. The result was that production was being slowed by each employee who took a break. Refreshment-taking finally grew to such proportions that the company put a new rule in effect. Breaks were to to be limited to specified times in the morning and in the afternoon. All employees were to take a break at the same time.

The union insisted that the rule was invalid. Claimed that it affected working conditions and such matters had to be negotiated.

Three men violated the rule and were reprimanded by the company. The test case was dumped into the lap of the arbitrator for final decision on the rule's validity.

In upholding the rule, the arbitrator recited the familiar residual rights theory, namely: "The basic rule of labor management relations is that management has all rights except those which it has bargained away in the contract. Among the prerogatives of management there has always been the right to make reasonable rules for the governing of the conduct of the plant and its employees. There is no question here that the contract does not have any provision governing the making of rules. So we must conclude that the right . . . has never been abrogated or bargained away."

The union's answer was that the company hadn't merely made a rule in this instance. It had changed working conditions—a horse of a different color. On the contrary, responded the arbitrator. The company officially recognized the break and established it. "The only thing that was done here was to change the time of taking the break. Or rather to establish the right to break at a certain time. It was merely creating order in the plant under management's duty to see to it that the plant is run efficiently."

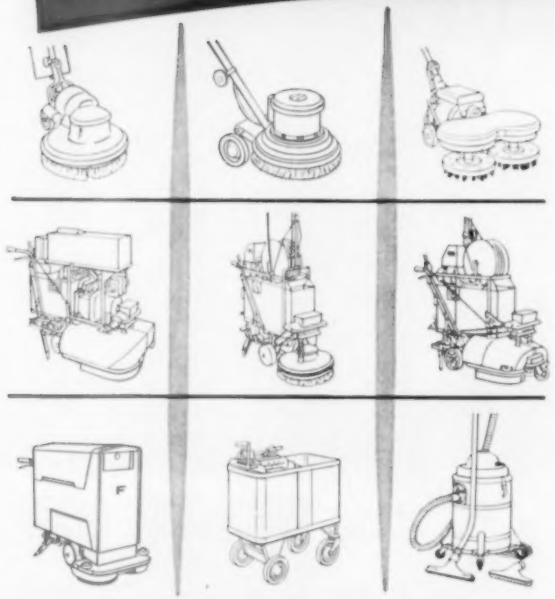
Turn to page 212

Keep your floor-maintenance men happy . . .

with *Job-Fitted* EQUIPMENT!

Choose from the COMPLETE *Finnell* Line

More than a score of models and sizes permits selection of the equipment that's exactly right for your job!



However much a maintenance man may want to do a good job, and at the same time show savings in labor costs, he's *stymied* if the machine is too small, or too large, or is otherwise unsuited to the job. Different floors and areas call for different care and equipment. That's why *Finnell makes more than a score of floor-maintenance machines.* From this complete line, it is possible to choose equipment that is correct in size as well as model . . . that provides the maximum brush coverage consistent with the area and arrangement of the floors.

Finnell offers *Conventional Polishing-Scrubbing Machines* in both concentrated and divided-weight types, each in a full range of sizes . . . a *Dry-Scrubber,* with self-sharpening brushes, for cleaning grease-caked floors . . . *Combination Scrubber-Vac Machines* for small, vast, and intermediate operations, including self-powered (gasoline, propane, and battery) as well as electric models . . . *Mop Trucks* . . . a full line of *Wet and Dry Vacuum Cleaners, Attachments,* and *Accessories.* In addition, *Finnell* offers *Cleansers, Sealers,* and *Waxes* of every requisite type . . . *Steel-Wool Pads* and other accessories—*everything for floor care!*

In keeping with the *Finnell* policy of rendering an individualized service, *Finnell maintains a nation-wide staff of floor specialists and engineers. There's a Finnell man near you* to help solve your particular floor-maintenance problems . . . to train your operators in the proper use of *Finnell Job-Fitted Equipment and Supplies* . . . and to make periodic check-ups. For consultation, demonstration, or literature, phone or write nearest *Finnell Branch* or Finnell System, Inc., 2505 East Street, Elkhart, Indiana. Branch Offices in all principal cities of the United States and Canada.

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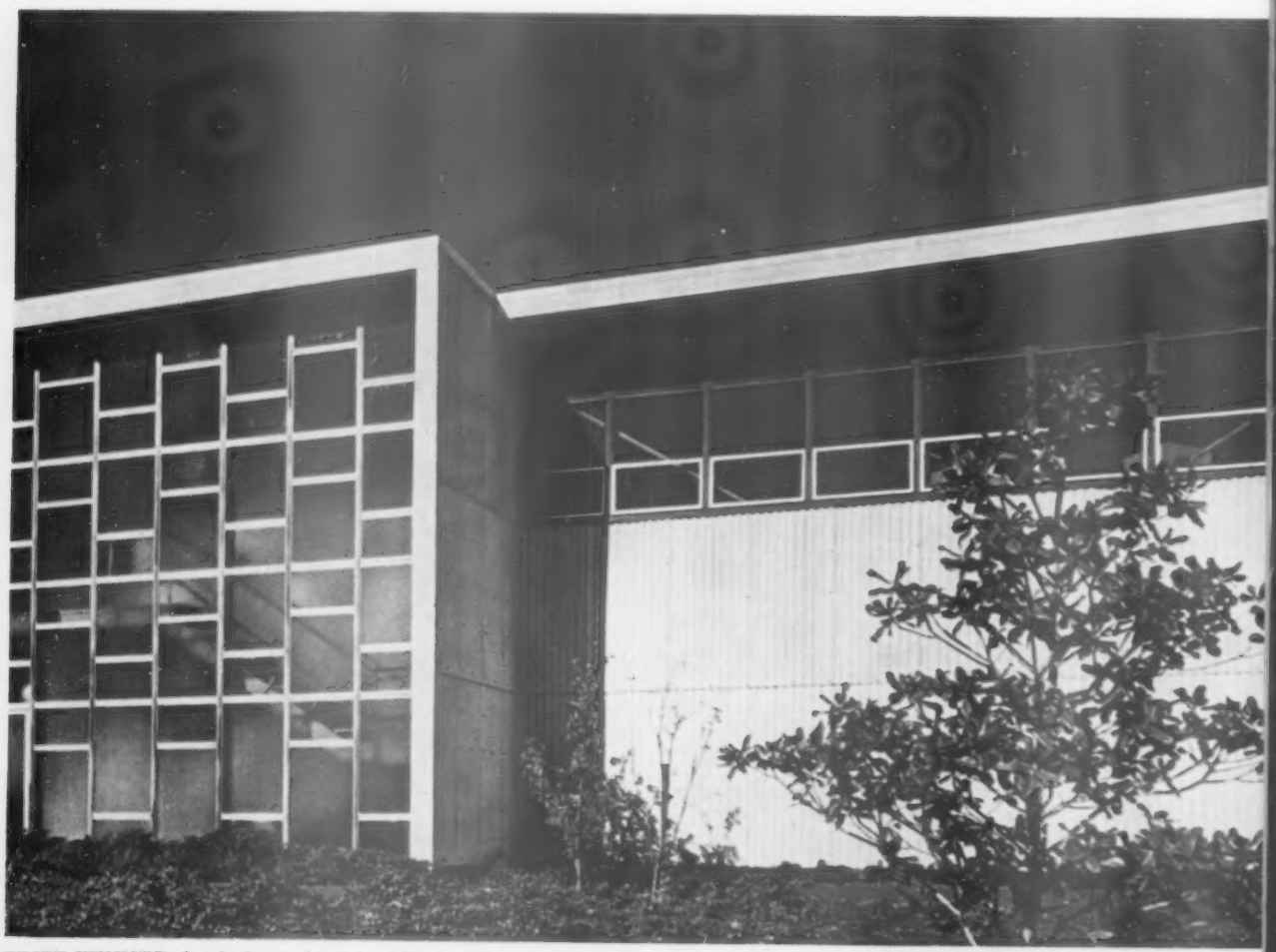
Originators of Power Scrubbing and Polishing Machines

Everything FINNELL for Floor Care

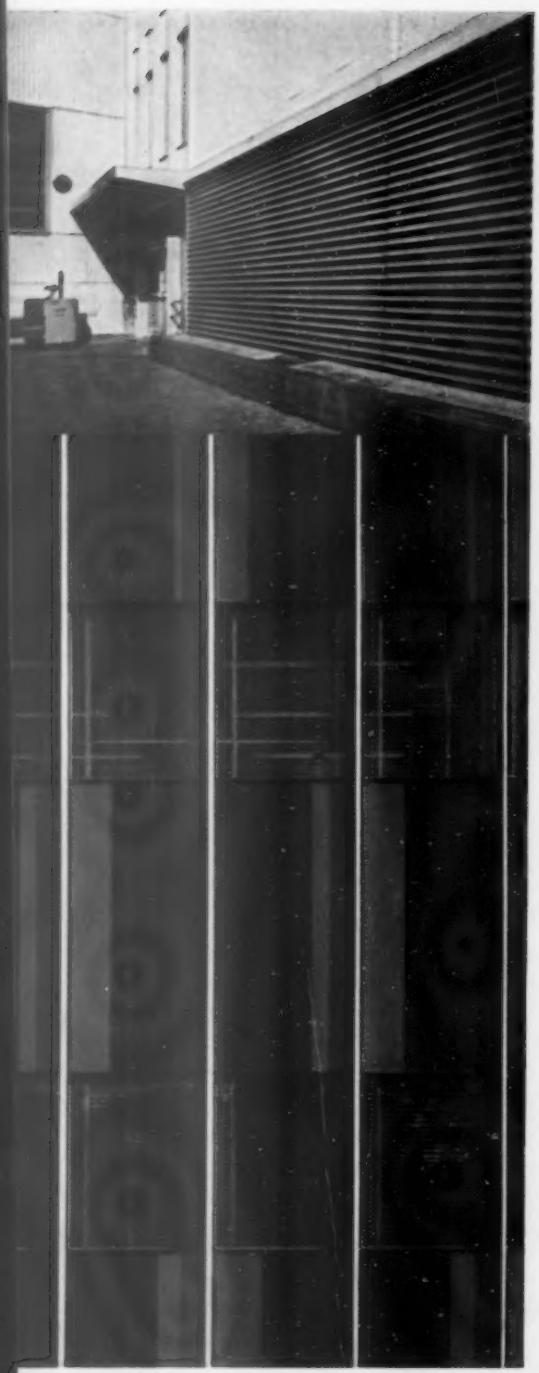
BRANCHES IN ALL PRINCIPAL CITIES

WALLS

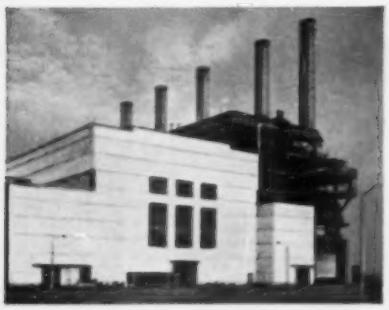
Build Prestige With Striking Modern Buildings...
do it economically with Johns-Manville Building Products.



PRIZE-WINNER for looks and praise-winner for economy can be yours with Johns-Manville Corrugated Transite. These fire-safe, asbestos-cement panels can be used over steel or wood framing. In the building above, Corrugated Transite is used for main wall areas, along with Flat Transite sheets around doors and windows.



CORRUGATED PANELS GIVE DISTINCTION to massive designs. Note how these fireproof, wear-proof asbestos-cement sheets of Johns-Manville Corrugated Transite add strong directional shadow lines (left). Large-size sheets cover big areas in a hurry (below).



A new building that will put your best company face forward? Or are present buildings in need of modern additions? In either case, Johns-Manville Building Products have much to offer you. Shown here are prestige-building examples of ways to use various Johns-Manville quality materials for exterior walls.

For more than a century, Johns-Manville has been famous for its leadership in research and in the development of quality building products. For more specific information on any of the wall panels shown here—or any of the other J-M products for building and industry—write Johns-Manville, Dept. FA-5, Box 158, New York 16, New York. In Canada, address Port Credit, Ontario.

MORE LIGHT COSTS LESS and you add beauty to the building when you use translucent Johns-Manville reinforced fiber glass Corrulux panels. The panels, used above the windows in this school, are completely shatterproof. Corrulux is available both flat and corrugated in a wide range of colors.

OUTSTANDING GOOD LOOKS in curtain-walls come with the use of J-M Micro-Flexboard base panels. You can have virtually any material laminated to Micro-Flexboard; finished panels are uniformly flat and free from a "wavy" look. These walls are porcelain on a metal skin laminated to Micro-Flexboard.

HEATS AND COOLS BETTER. J-M Transitop panels for this industrial laboratory provide exterior and interior asbestos-cement surfaces enclosing a core of insulating material. You get lasting, attractive appearance *and* reduced heating and cooling costs from one easily-installed large-size panel.

JOHNS-MANVILLE

JOHNS-MANVILLE JM PRODUCTS

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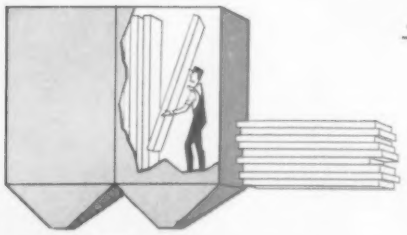
For more facts Circle 779 on Reader Service Card

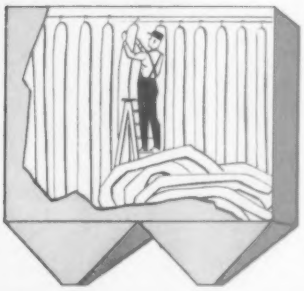
SINCE 1870 SLY

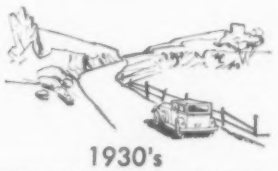
SLY DUST FILTERS
For
ACCESSIBILITY



1900's
SLY DUST ARRESTER

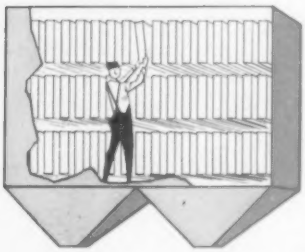
Every cloth screen from the end of the arrester had to be removed to reach the faulty screen.





1930's
SLY TUBE-TYPE FILTER

To replace a tube required at least partial disassembly of every other tube in the way.



TODAY
NEW SLY
"ROLL-CLEAN"
DYNACLONE®

Any filter bag is easily accessible and can be replaced without need for removing others.

NEW SLY DYNACLONE PROVIDES
FASTEST, EASIEST BAG CHANGING

Whether you change one bag, or the entire filter, you do it in less time with the Dynaclone. Quick replacement of individual bags eliminates the need for costly rebagging should only a few be worn. Complete change is also fastest . . . the Dynaclone has only one half as many bags as other filters with the same cloth area. In addition . . .

New "Resist-O-Wear" bags offer 200 to 300% more bag life.

The Dynaclone operates continuously. It provides complete dust suppression through constant suction.

The Dynaclone is automatically self-cleaning by reverse air. A single exhaust fan provides *both* suction for dust collection and air for bag cleaning. No auxiliary blowers required.

And the Dynaclone provides 20 to 40% more cloth in a given space than other makes of dust filters.

The Dynaclone has been proved in more than 1,000 installations. Investigate its advantages on your applications . . .

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Begins on page 208

No Funeral, No Pay

No funeral pay for this absent employee. There was no testimony that he actually attended the funeral.

Death-in-the-family clauses of union contracts run from the general payment for "death in the immediate family" to detailed listings setting forth the various relationships for which the company is willing to pay when death occasions absence.

There's probably more sentiment about this type of clause than any other in the contract. And it is one that can make the company look awfully cheap if it tries to button it up tightly.

One company had its mind on the purse strings when it added a proviso to its death-in-the-family clause that there would not be pay for the three-day absence specified in the clause if the absent one didn't in fact attend the funeral. An arbitrator upheld such a proviso when no evidence was presented at the hearing that the grieving employee had attended the funeral. The employee was not even at the hearing. Why he didn't attend isn't clear. Possibly he simply refused to testify publicly about such an intensely personal issue.

But he lost three days' pay. The arbitrator absolutely refused to consider a post-hearing affidavit from the absent employee that he had attended the funeral.

Whose Side Now?

As a rule, an employer can select any one he wishes to negotiate for him. But he may go too far if he selects an ex-employee of the union.

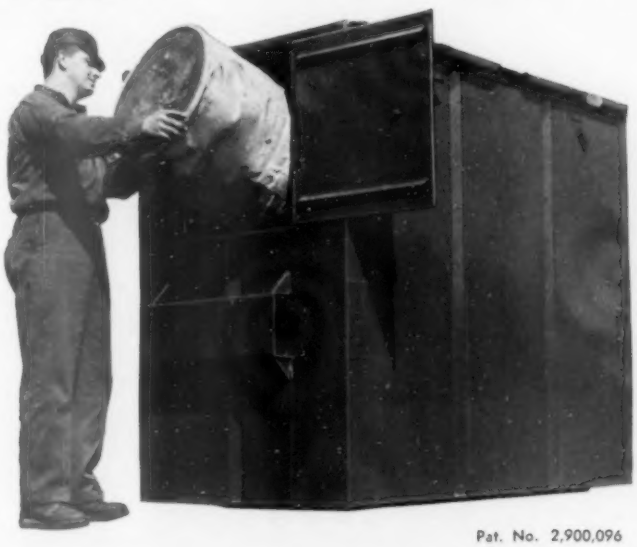
And he may not get away with it. From time to time employers must dream about how nice it would be to have a former union employee on the company's negotiating team. He could disclose the union's tricks and tactics.

For most employers it remains a dream, but not with one manufacturers' association. This group hired a former employee of the International Ladies Garment Workers Union to represent it in negotiating with that union.

Trying to keep one step ahead of

For more facts Circle 780 on Reader Service Card

How our small plant solved its waste disposal problem WITHOUT CAPITAL OUTLAY....



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DEMPSTER-DUMPMASTER Equipped Hauler Provides Containers and Service for Small Fee

Our small Midwestern manufacturing firm did not generate enough refuse to justify ownership of its own refuse disposal system. Yet, it was plagued by unsightly trash piles, fire hazards and scattered refuse in the plant yard.

Our plant engineer then heard of a DEMPSTER-DUMPMASTER equipped private hauler in the adjoining city. A survey revealed that two big-capacity refuse containers, placed one at each end of the plant, would handle the entire refuse accumulation.

The private hauler placed the containers, and a small monthly fee covered maintenance, labor, hauling and dumping refuse. No capital outlay was involved, disposal costs were reduced, and plant housekeeping was vastly improved.

In all major cities, private haulers who own DEMPSTER-DUMPMASTER equipment render fast, efficient, low-cost refuse storage and collection service. They place one or 100 containers at your service for a reasonable fee. A free brochure describes their service in detail.

Free Brochure and Name of Nearest Private Hauler on Request

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IN ALL LEADING CITIES FROM COAST TO COAST

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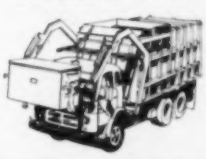

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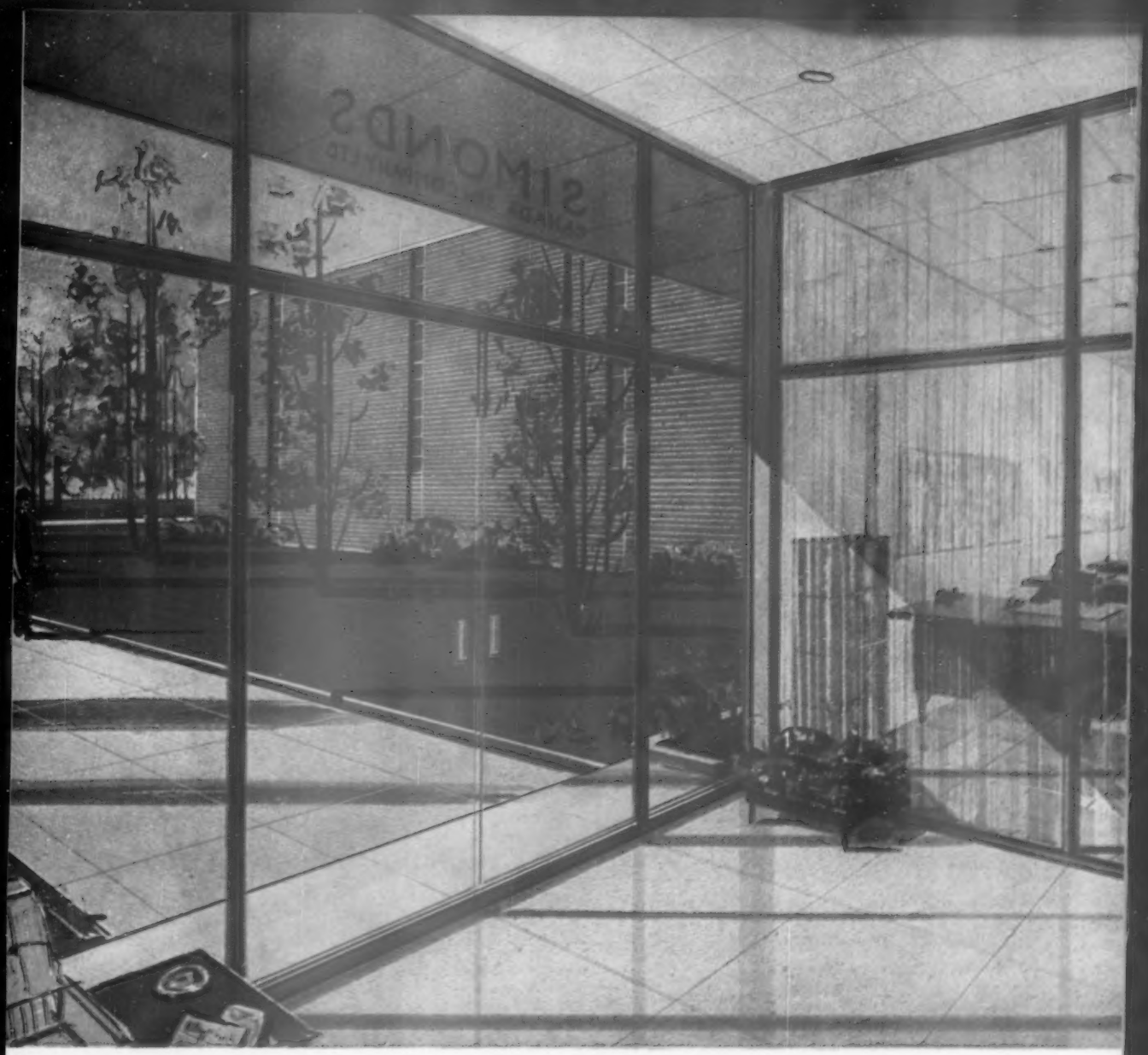
DEMPSTER DUMPMASTER®

EQUIPPED PRIVATE HAULERS



FRIENDS TELL "SIMONDS SAW"—
AND WE WIN A NEW CANADIAN CUSTOMER

When a customer gives us repeat business we're always happy. We're doubly delighted when his enthusiasm sends us a new client; this happened in Quebec recently. Simonds Canada Saw Company, Limited, needing new manufacturing facilities at Granby, checked with their friends at National Electric Coil Canada, Limited—for whom we had built a plant in nearby St. Jean. The people at St. Jean were happy with their plant and said so (and told *us* they hoped we would get the job).

It helps to come well recommended, but you always must prove yourself, of course. The Simonds Saw people termed our proposal the most comprehensive they had seen, with an imaginative design approach—especially the unusual, yet functional, vertical windows.

Repeat business accounts for ninety per cent of our volume, but all of these customers were new at one time. That's why we particularly enjoy business that results from one satisfied customer telling another.

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PROJECT: **New Manufacturing Plant for Simonds Canada Saw Company, Limited**

STORY: **Complete "Single Responsibility" Service by Cunningham-Limp**

This new factory in Granby, Quebec, is further proof of an old building fact: the way to get the plant you need is to assign the *complete responsibility* to Cunningham-Limp. If you do not have a site, we can help you select one "scientifically." Your plant will be designed to suit your individual requirements—engineered to mesh with both your present and future requirements, built with both present and future economy in mind. In addition to designing, engineering and building the plant, we have the experienced personnel to make the plant production layout; design and install your materials handling systems; plan, purchase and install all equipment. Everything, in fact, from initial site development through the interior decorating of the private offices and landscaping of the grounds, can be handled by C/L under our single responsibility service.

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An engineering-economic analysis is our usual approach to any project. This unbiased analysis defines project requirements and insures that costs are geared to the potential earning power of the proposed investment. It is an important factor in securing capital funds on an economical basis, in sums from—$50,000 to $50,000,000. One of the available financing methods is the Sale-Leaseback for both structures and production equipment. It has attractive advantages for the company with a good credit rating which needs to conserve capital for day to day working requirements.

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Whenever reference is made to designing, engineering or architecture, the work will be done by Cunningham Engineers, Inc., or by personnel who are qualified under all applicable laws.

the association, the ILGWU refused to deal with their former official. An NLRB Trial Examiner declared it was unlawful to refuse to deal with him. Cited the Taft-Hartley Act provision that gives employers the right to select their own collective bargaining representatives. A U. S. court of appeals at Philadelphia agreed that this was the general rule, but further expressed the thought that it was not absolute or immutable. Mitigating circumstances might make it inapplicable. Such as in the ILGWU case.

For 10 years the former ILGWU official had served in the area where some of the association members had their plants. The association employed him to perform the same functions he had previously performed for the union. Said the court: "The association clearly displayed an absence of fair dealing in selecting and insisting on the turncoat union man as its bargaining representative. Thus its offer to bargain was not made in good faith." The union's duty to bargain under such circumstances was suspended.

Pranksters—Away

This arbitrator proved he was not an old softy. He upheld the discharge of an employee who fired a cherry bomb in the locker room.

Some plant executives feel that when it comes to discharging a good employee for a rules infraction, the arbitrator would rather give the plant away first. Arbitrator Jay Murphy proved he was made of sterner stuff and upheld the discharge despite union pressure not to. But the rule infraction was a serious one.

An employee lit a cherry bomb in the locker room of a chemical plant—just to be playful. It hit the eye of a lunching employee, necessitating hospitalization and medical care. But this employee came out of it all right. The cherry-bomb lighter did not. He was fired under the contract rules, which read: "Horseplay of a type which endangers the health or safety of other employees is just cause for discharge."

The union pleaded for a lesser penalty. Mentioned that the employee had given seven years of good service to the company, meant no harm when he lit the bomb.

Nothing doing, ruled Arbitrator Murphy. The discharge stood.

This was a safety violation affecting the entire plant and all its employees (it was a chemical plant). It could have had a disastrous effect. It was only luck that it didn't.

Benefits for Whom?

Does your benefit booklet clearly set forth group for which intended?

This is a pertinent question for those who write benefit booklets for employees. One company had a brown booklet that described insurance benefits for union employees. In fact, the provisions of the booklet were incorporated in the union contract by reference. A green booklet described benefits for "all full-time employees who are actually working on January 3, 1956." The benefits in the green booklet were higher—were not meant for the union group. Nevertheless, a union member claimed he was entitled to the higher benefits of the green booklet because he met the definition. Further, he claimed that he was given the green booklet by the sales manager and was told that the benefits of the brown booklet had been increased.

The arbitrator handed the award to the company. Found absolutely no evidence that negotiations had resulted in higher benefits for the union workers. But a lot of fuss and feathers might have been avoided if the definition in the green booklet had been more specific.

Union Dues Illegal

The NLRB states that dues payment by supervisors—as a condition for re-employment in the union ranks—is illegal.

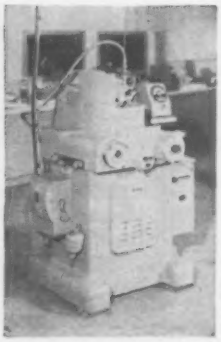
Union members are sometimes promoted to supervisory jobs. Under many union contracts, when this happens they lose their claim to production jobs. Of course, they can come back in at the bottom of the seniority ladder like a new employee. But loss of seniority is the big thing.

Some companies, to encourage union-member acceptance of promo-

NOW YOU CAN INSTALL ALL YOUR MACHINES

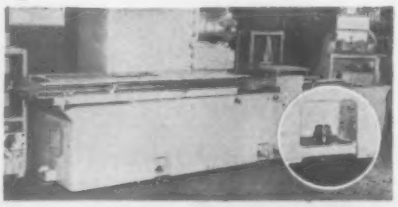
in a low cost "Do-It-Yourself" way by using Air-Loc® 4·17·4

- to reduce vibration and noise
- to permit easy shimming
- to hold precision level

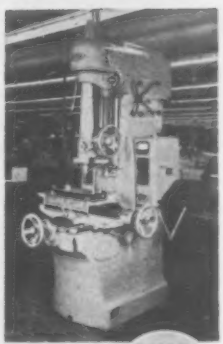


Taft-Peirce 6" Rotary Surface Grinder is on AIR-LOC to reduce transmitted vibration.

You need no bolts or cement with AIR-LOC. Many firms keep sheets of AIR-LOC on hand and cut mounts to correct size. When you move machines, you can re-use your AIR-LOC mounts, which have such great resilience that they do not take a permanent "set".

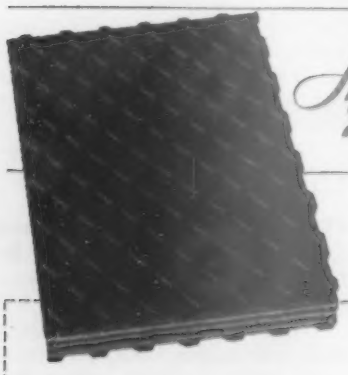


Cincinnati Planer stays level to .0005" installed on 8 AIR-LOC mounts. Leveling screws for precision adjustment.



Moore Jig Borer installed on AIR-LOC mounts without bolts or cement.

Air-Loc® 4·17·4 • • • is an engineered mount that can be loaded to 1,000 p.s.i. It is sold in 18" x 36" sheets, easy to cut with a saw. To *maintain* the precision which is built into your machines, plan now to install them the easy AIR-LOC way.



You get a permanent precision installation with patented AIR-LOC mounts that *Resist* oil, water and alkali, *Permit* easy leveling, *Eliminate* need for bolts or cement, *Hold* machines in place, *Reduce* transmitted vibration from the floor.

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Begins on page 208

tion to supervisory jobs, have tried to get the union to go along with giving supervisors the right to bump back into the unit with the seniority they had when they left. Some try to get the union to go along with adding supervisory time to former rank-and-file seniority.

The Kaiser Steel people were persuasive. A steelworker local went along with the idea of re-employing supervisors in union jobs without loss of seniority. But there was a price to pay. The supervisors would be required to pay monthly dues while they were supervisors. Kaiser agreed to this but the NLRB didn't. It reasoned that supervisors are beyond the pale of the rank-and-file unit. Supervisors are not obligated to maintain union membership as a condition of employment. Thus, to require them to pay union dues as supervisors was illegal.

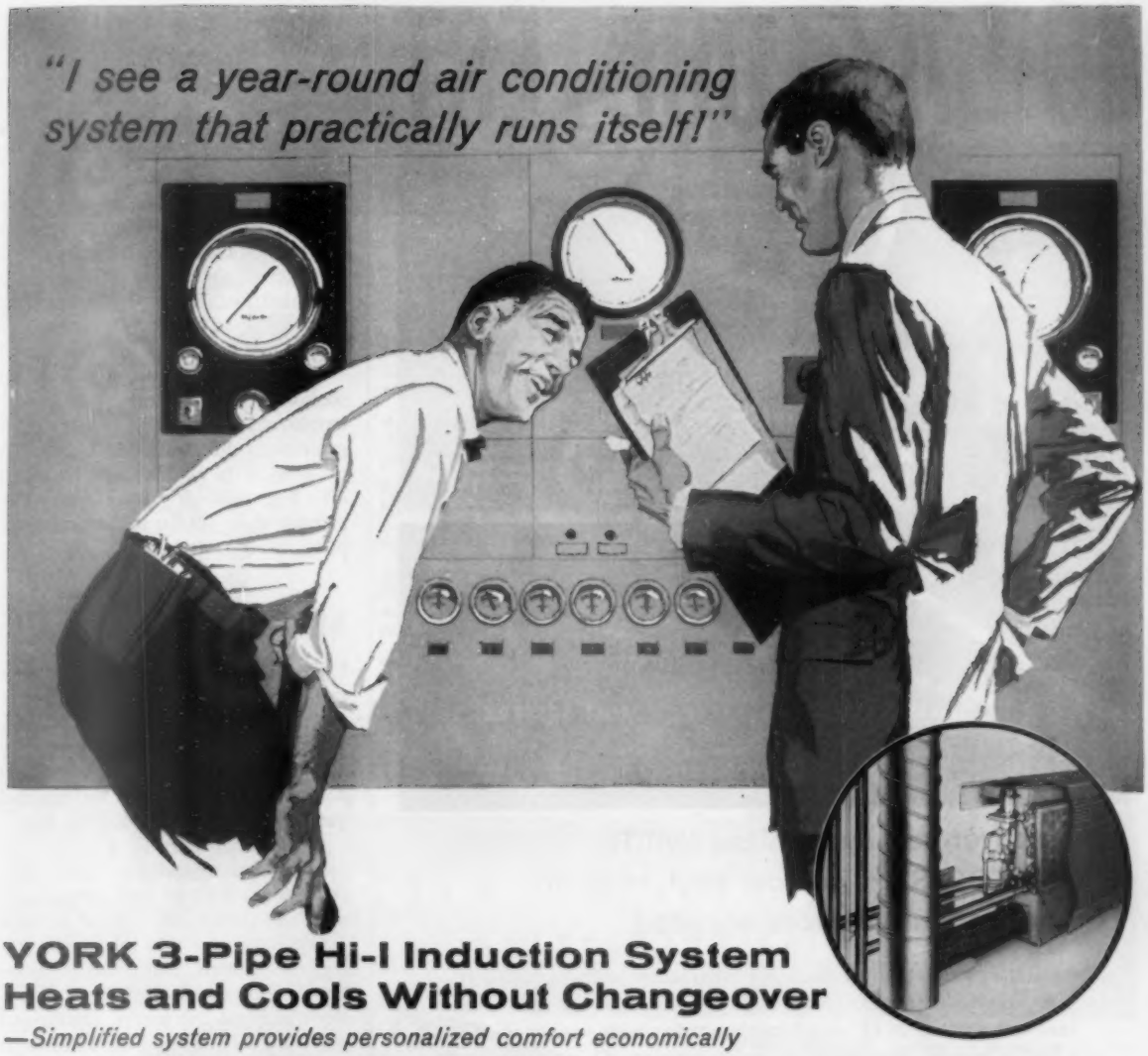
No Arbitration Here

Individual employees cannot compel arbitration of their grievances.

Section 9(a) of the Taft-Hartley Act doesn't give this right, ruled a Connecticut court. Under most union contracts, the union reserves to itself the right to ask for arbitration of grievances that have reached the last step in the grievance procedure. Occasionally, a clause does give the individual employee the right to compel his company to arbitrate his grievance—when the union refuses to carry forward.

The clause in General Electric Company's contract with Local 203 of the IUE was of the former type. It gave the *union only* the right to call for arbitration. And in this case it refused to process the grievances of several suspended G-E employees. When the company was asked by the employees to arbitrate, it refused. In fact, it later discharged them.

The discharged employees thought that the Taft-Hartley Act gave them the right to compel G-E to arbitrate despite the absence of such a right in the union contract. They supported their views by pointing to Section 9 (a) which reads "any individual employee or group of employees shall have the right at any time to



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—Simplified system provides personalized comfort economically

HOT AND COLD WATER AT EACH UNIT—York-designed, non-mixing, 3-way control valve selects either hot or cold water and modulates the flow to the coils to provide the desired room temperature at any time of day, all through the year.

HIGHER LEVEL OF COMFORT—Having both hot and cold source at each unit means instant response and allows wider temperature variation from room to room. This provides greatest personalized comfort and satisfies each occupant's exact wishes.

ELIMINATES MANY COSTLY COMPONENTS—Initial cost of York's 3-Pipe System is competitive with regular 2-pipe systems. Eliminating duplicate zoning equipment, costly controls and excess air for heating offsets cost of third pipe, saves space.

LOWER OPERATING COSTS—Each unit functions as a separate zone receiving just the right amount of either warm or cold water to maintain desired space conditions. If neither heating or cooling is needed, there's no flow. *No wasted energy!*

Another YORK Trail Blazer Concept Proved in Action at *Statler-Hilton Hotel, Boston, Mass.*—York 3-Pipe Hi-I Induction System delivers instant personalized comfort to 1,300 guest rooms. Compact, modern induction units replaced radiators, provide heating *and* cooling in same place.

YORK

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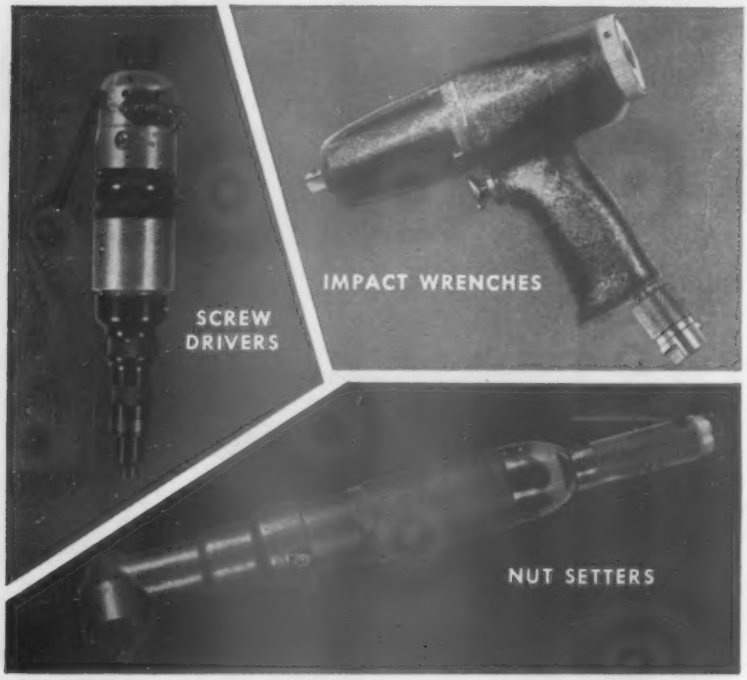
MAKE IT BETTER

10-DAY TOOL TEST



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Gentlemen: I want to run a Master Power 10-Day Tool Test. I understand there is no obligation.

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present grievances to their employer and to have such grievances adjusted without the intervention of the bargaining representative, as long as the adjustment is not inconsistent with the terms of a collective bargaining contract or agreement then in effect; provided further that the bargaining representative has been given opportunity to be present in such case."

A Connecticut court ruled that this section does no more than assure employees the right to present their grievances directly to their employers to see if they can be settled. That's all. The union contract alone can provide the right for union and company to arbitrate.

McCoy OK's Strikers

Union committeemen have no special duty to stop wildcat strikes.

Taking a fresh look, Arbitrator Whitley McCoy handed down the above decision. He concluded that committeemen cannot be singled out for discharge in such a case.

Many arbitrators on previous occasions have imposed a special duty on union stewards and committeemen: to stamp out wildcat strikes.

We have come to take such rulings for granted. But old-time Arbitrator Whitley McCoy, seeing the trees and not the forest, challenged that view. He ordered the Pittsburgh Standard Conduit Company to reinstate two committeemen fired when a night shift walked off the job. No other striking worker had been fired.

The committeemen should have tried to prevent the walkout—this was the standard argument raised at the hearing. It's their duty. But McCoy wanted to know, duty to whom? To the company? To the union?

A committeeman's duty runs to the union and the union members who elect him. He has no duty to the employer, said McCoy. But many of McCoy's fellow arbitrators will stick to their original views and disagree with him. They will still say that a function of the committeeman is to uphold and enforce the union contract—not encourage its breach. His "duty" to the company stems from his duty to protect the inviolate nature of the union contract.

For more facts Circle 785 on Reader Service Card

Plant workers prefer the resilience of Kreolite Wood Block Floors that cushion feet and eliminate needless fatigue.

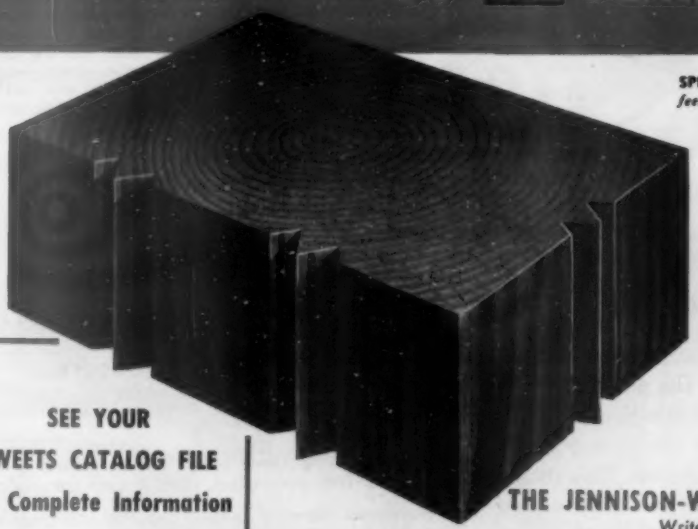
Maintenance engineers appreciate Kreolite's durability, its dust-free, skid-proof, spark-proof safety features.

Production Supervisors are enthusiastic Kreolite boosters; they like the added production efficiency made possible by resilient flooring.

Treasurers endorse Kreolite Wood Block Flooring because of its long life and low maintenance costs . . . it's the proven economy floor.

Presidents favor these floors for overall performance. The combination of extra features give Kreolite their unanimous vote of approval.

KREOLITE FLOORS ARE FAVORED BY ALL PLANT PERSONNEL



SPECIFY KREOLITE . . . *Hundreds of millions of square feet used by leading industries since 1911.*

1 Comfortable to work over . . . easy under foot
2 Durable . . . Withstands heavy abuse.
3 Resilient . . protects dropped tools and parts
4 Quick to install . . . can be used immediately.
5 Assures firm foundation for machines.
6 Easy to replace . . . in sections or by units.
7 Affords low maintenance cost, ½ of 1% in 20 years.
8 Offers low tractive resistance . . . easy to truck over.
9 Dustless . . . protects bearings and finished product.
10 Absorbs noise.
11 Lessens vibration.
12 Insulates against heat and cold.
13 Spark-proof, skid-proof, safe . . . with "Kreolite Jennite" Filler.
14 Easy to provide for conduits or cables.
15 Eliminates glare from reflected light . . . decreases eye strain

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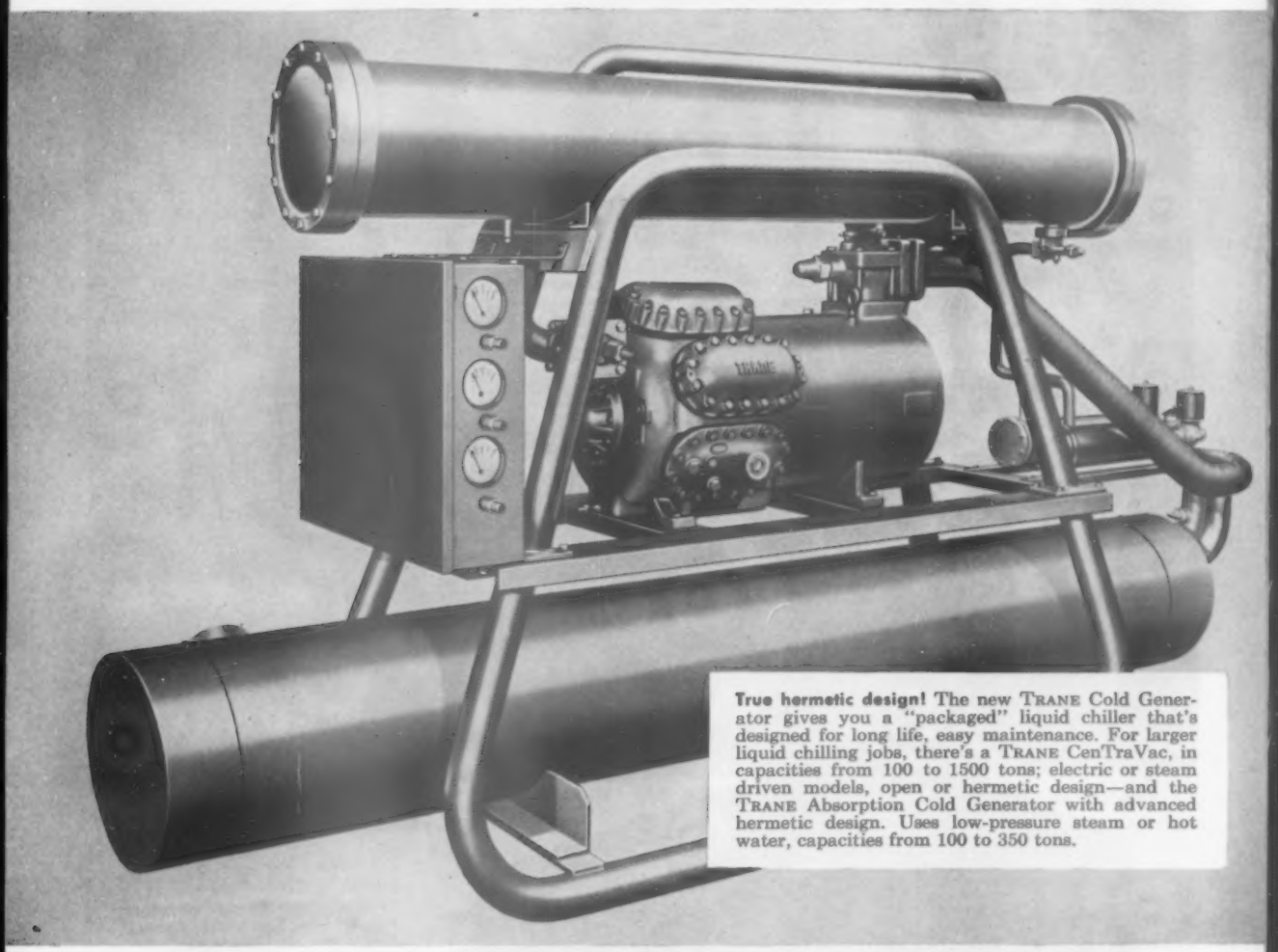
THE JENNISON-WRIGHT CORP., TOLEDO 9, OHIO

Write for Complete Installation Data

KREOLITE WOOD BLOCK FLOORS

ALSO "KREOLITE" RAILROAD CROSS & SWITCH TIES • INDUSTRIAL TRACK TIES • COAL TAR PRODUCTS • BRIDGE & DOCK LUMBER

Cut liquid chilling costs-with this new Trane



True hermetic design! The new TRANE Cold Generator gives you a "packaged" liquid chiller that's designed for long life, easy maintenance. For larger liquid chilling jobs, there's a TRANE CenTraVac, in capacities from 100 to 1500 tons; electric or steam driven models, open or hermetic design—and the TRANE Absorption Cold Generator with advanced hermetic design. Uses low-pressure steam or hot water, capacities from 100 to 350 tons.

Now! A hermetic model of the Trane Reciprocating Compressor!

Here's a new, efficient Reciprocating Compressor that's *fully hermetic*, designed for the more rigorous demands of R-22. This unit is of single-housing construction. Motor and compressor are in one shell, with a bolted end cover for easy access. This minimizes alignment problems experienced with other hermetic compressors that have 2-part housing.

The new TRANE Hermetic Reciprocating Compressor has multi-step capacity control that saves power by reducing starting, stopping. And the truly hermetic design eliminates crankshaft seal and coupling to provide quiet operation, simplified installation, longer life.

Check these features:

- **Designed for R-22 and R-12** (not a converted R-12 machine).
- **Single-housing construction** for simplified installation, trouble-free operation, easy access for maintenance.
- **Multi-step capacity control** reduces starting, stopping, saves power.
- **Exclusive internal thermal protector,** located in the motor windings, protects against any condition that causes high motor temperatures.
- **Large suction chamber** and cylinder head safety springs provide protection against refrigerant slugging.
- **Available** in sizes from 10 to 100 tons.

For more facts Circle 787 on Reader Service Card

for comfort or process-
Hermetic Cold Generator

Advanced hermetic design assures long, trouble-free life, quiet operation. Cuts installation costs.

Here's low-cost, efficient liquid cooling for process or comfort—from TRANE, long an industry leader in reciprocating water chillers. It's the new TRANE Reciprocating Cold Generator, now *hermetic*, with TRANE chiller and condenser —plus a new TRANE Hermetic Compressor (illustrated and described below).

A major step forward in industrial liquid cooling equipment, this new Hermetic Cold Generator features lightweight, compact design that simplifies installation and maintenance. It is completely factory-wired and assembled, with prewired control panel mounted directly on the unit to eliminate much on-the-job installation labor. Designed for R-22 and R-12, it is available in a complete range of 11 sizes from 10 to 100 tons.

When you plan industrial liquid chilling equipment—for processing or air conditioning—contact your nearby TRANE Sales Office for facts on the complete line of TRANE water chillers from 10 to 1500 tons; or write TRANE, La Crosse, Wisconsin.

Check these advanced TRANE features:

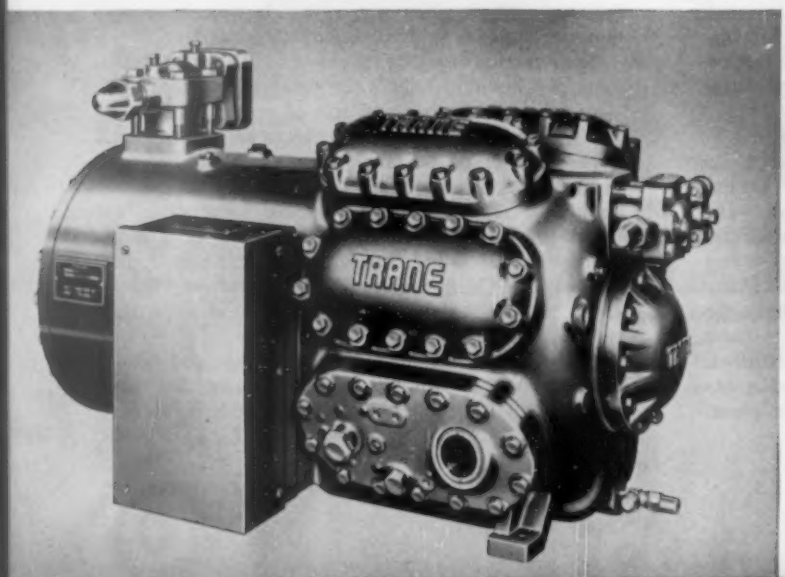
- **All major components,** chiller, condenser, compressor, designed and built by TRANE.
- **Advanced hermetic design** assures maximum efficiency, simplified maintenance and installation.
- **Compact size;** small enough to pass through a standard 36″-wide door.
- **Packaged design;** factory-wired and assembled to cut on-the-job labor. Pneumatic or electric control panel mounted and prewired.
- **Versatile.** May be used for any process or comfort liquid cooling application . . . to maintain constant temperature for electro-plating baths and other critical operations. Units available for use with evaporative or air-cooled condensers.

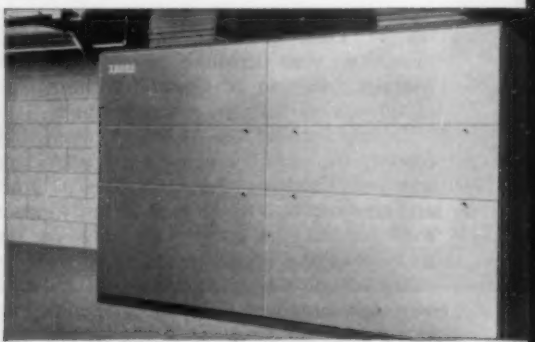
For any air condition, turn to

TRANE

MANUFACTURING ENGINEERS OF AIR CONDITIONING, HEATING, VENTILATING AND HEAT TRANSFER EQUIPMENT

THE TRANE COMPANY, LA CROSSE, WIS. • SCRANTON MFG. DIV., SCRANTON, PA. • CLARKSVILLE MFG. DIV., CLARKSVILLE, TENN. • TRANE COMPANY OF CANADA, LIMITED, TORONTO • 100 U. S. AND 19 CANADIAN OFFICES





Trane Commercial Self-Contained Air Conditioners feature the new TRANE Hermetic Compressor. Quiet and compact, these units provide maximum cooling comfort for office, laboratory or factory areas. Job-matched to fit your budget, fit your needs. Air or water-cooled models in sizes from 10 to 50 tons.

Bidding Up for Engineers

Engineering graduates at Stevens Institute of Technology, Hoboken, N. J., are auctioning off their talents at higher starting salaries than ever before. Prospective employers are expected to bid the price for 1960 graduates up to $525 per month, according to Harold R. Fee, placement director.

His prediction followed a recent 6-week interviewing period, conducted by 230 companies from New Hampshire to California. Only 216 seniors were available at Stevens as prospective employees.

Since 1955, when $378 per month was an average, starting salaries for engineers have been rising steadily. Number of companies sending recruiters to Stevens also jumped from the 1955 figure of 167. Still unchanged are the qualities sought by the employer. Most in demand are seniors with good grades, who are engaged in extra-curricular activities and who work well with their fellows.

Plant With Box-Office Appeal

Want to know what effect your long-range community relations program has on your employment image? Then take a look at the line-up of job applicants in your personnel office. That's how Delco Moraine, division of General Motors Corporation (Dayton, Ohio), knows where it stands.

During January and February, over 3000 people (double the plant's employment roster) applied for work with no prompting from ads or other formal announcements. Word that a few openings were available had gone out over the grapevine and spread to neighboring states. Applicants came in saying "they tell me this is a good place to work." Many were still employed by other companies. What's the reason for this storming at the gates? It's because the division has a reputation for its worker benefits. One applicant even offered a week's salary in exchange for the privilege of working at the plant. (P. S. He wasn't hired.)

One Egg to a Basket

When several jobs need to be assigned to a person, hand them out one at a time. That's a sure way to get all of them done right, says Rogers, Slade & Hill, New York management consultants. If it's a multiple job, put it in writing. List the procedures in the order you'd like them done. Even if a sequence is unnecessary, step-by-step follow-up is a guide along a clear-cut path. And ticking off each step conveys the feeling of accomplishment—a big factor in successful performance. Remember the old saying: "To require two things is the best way to insure that neither will get done."

Shrewing of the Tame

Look to the little woman at home if you have drinking problems in the plant. She's often happier when her spouse is drinking too much, says Dr. John L. Norris, medical director of Eastman Kodak Company, Rochester, N. Y. "Some women do everything in their power to drive their husbands to the bottle," claims Norris, an expert on alcoholism in industry. "And when the husbands quit, they attempt to get him to drink again," he added.

Such women enjoy being martyrs. They can dominate the situation only when the husband is drunk —or when he's sober and full of remorse.

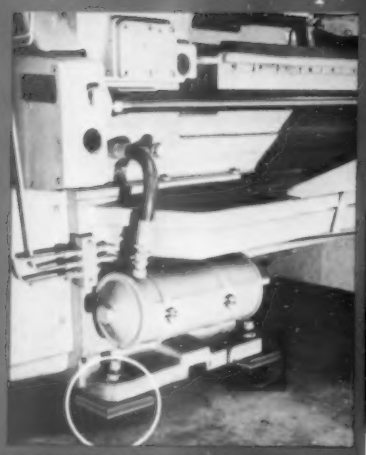
Norris suggests a plant program to help these men. Supervisors could be taught to notice symptoms of drinking problems in workers. Early recognition could aid rehabilitation. Here are some clues to watch for: (1) consistently making a fool of himself at parties; (2) doing things that interfere with his self-respect; (3) unexplained absenteeism or "hangovers" following pay days; (4) decrease in work output following pay days.

If the man has gone beyond this stage and draws a blank on happenings of the previous day, you may have a full-blown alcoholic on your hands.

Turn the page

For more facts Circle 788 on Reader Service Card ➤

UNISORB MOUNTS MAKE THE DIFFERENCE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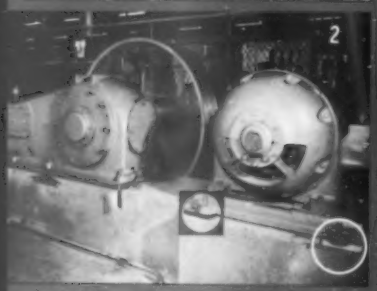
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in Performance
in Vibration Control
in Simplified Installation

Unisorb Pads and Unisorb Level-Rite Mounts have created a completely new concept in machine mounting! With this modern method, you can achieve unusual — yet very real — economies and efficiency in machine installation and performance. Here's why . . .

- Unisorb actually saves up to 80% in cost over conventional methods. Time savings run equally high.
- Up to 85% of transmitted vibration is absorbed
- Machines can be run at top speeds
- Noise is greatly reduced, worker efficiency improved
- Machines are protected from induced vibration, quality maintained
- Building maintenance is reduced
- Installation is completely streamlined — no hole drilling, bolting, lagging or tricky spotting
- Machinery is always ready to move. A production line or a whole plant can be changed overnight.

A complete line of mounts . . . Unisorb is made in a wide variety of densities and thicknesses (listed on the back), engineered for all types of machines . . . from laboratory equipment to heavy production presses. Send the coupon for details about Unisorb Mounting in your plant — or ask for a money-back offer to prove it to yourself. Call or write today.

1. Unisorb pads help manufacturers move entire plants quickly and efficiently. They are shown here under a production lathe, one of over a hundred machines re-installed by this modern method.
2. Unisorb provides high vibration absorption and noise reduction in this compressor and motor installation, always a tricky problem.
3. Precision grinders and machine tools are mounted on Unisorb for maximum vibration reduction, increased operating speeds and longer machine life.
4. Unisorb is ideal for heavy presses and production equipment because 85% of transmitted vibration is absorbed. Unisorb Cement provides ample holding power where unusual side thrusts are present.
5. Unisorb Level-Rite Mounts provide a positive and simplified method for installing lathes, millers and similar machines. Precise level is maintained by a "free-floating" screw-post which also compensates for uneven or pitched floors.

UNISORB

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UNISORB machine/mounts

UNISORB PADS

Loading Ranges

Type "H"* ..... 5- 50 Pounds PSI
Type "E" ..... 50-100 Pounds PSI
Type "T" (For Precision Mounting).... 50-125 Pounds PSI
Type "D" ..... 100-250 Pounds PSI

*Available with pre-applied pressure sensitive cement, for use only where leveling is not required.

UNISORB CEMENT

Unisorb Cement is a special adhesive designed to hold machines in place without lag bolts or screws when used with Unisorb. It has a holding power of 90 pounds per square inch minimum plus the weight of the machine — or equivalent to approximately 15,000 pounds per square foot. It is not affected by oil, water, cutting compounds and most other solutions found in the average plant. However, the proper solvents, readily obtainable in chemical supply houses, will soften the cement to allow relocation of equipment.

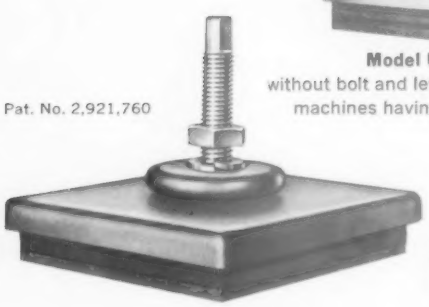
Unisorb Cement is effective in a wide temperature range — from minus 30° to plus 275° Fahrenheit. It will adhere to all oil-free surfaces. Meets Boeing Spec. #5010. It is not inflammable by ICC regulations. Available in pint, quart and gallon cans. 1 quart covers 500 square inches of Unisorb pad, both sides.

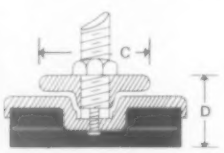
Unisorb Cement can be used to bond Unisorb to steel, iron, concrete, wood and other types of floors. If you have a special type floor let us give you the proper recommendations.

UNISORB® LEVEL-RITE® MOUNTS

Model UL — Base Unit
without bolt and leveling platform for use with machines having built-in leveling screws

Pat. No. 2,921,760



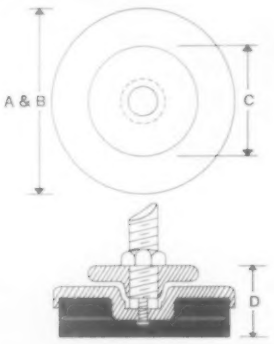


SPECIFICATIONS

Model	Max. Load lbs.	Dimensions — Inches Wide	Long	Leveler Dia.C	Leveler Min. Height D	Bolt Diam.	Unisorb Type	Model
LR-8	800	4⅛	4⅛	3	1½	⅛	H	UL-8
LR-8D	2400	4⅛	4⅛	3	1½	⅛	D**	UL-8D
LR-12	1250	4⅛	4⅛	3	1½	⅛	E*	UL-12
LR-18	1800	6⅛	6⅛	4	1½	¼	H	UL-18
LR-18D	5400	6⅛	6⅛	4	1½	¼	D**	UL-18D
LR-27	2700	6⅛	6⅛	4	1½	¼	E*	UL-27
LR-32	3200	8⅛	8⅛	5	1½	⅜	H	UL-32
LR-48	4800	8⅛	8⅛	5	1½	⅜	E*	UL-48
LR-75	7500	10⅛	10⅛	7	1⅛	1	E*	UL-75

*High Density Unisorb.
**Super Dense Unisorb Designed for Lathe Mountings and Long Bed Machinery with Central Drives.
Standard Bolt Length 6". 10" Length Bolt available.

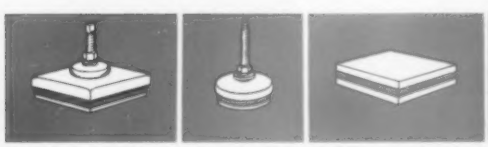
UNISORB® LEVEL-RITE® "200"



SPECIFICATIONS

Model	Max. Load lbs.	Dimensions — Inches A Width	B Length	C Diam.	Leveler D Min. Height	Bolt Diam.	Unisorb Type
200	200	2⅛	(Diam.)	1⅛	5/8	5/16	H

Send us your requirements for price and delivery quotations.



UNISORB

A DIVISION OF THE FELTERS COMPANY, 206 SOUTH ST., BOSTON, MASSACHUSETTS

FC9-67

Begins on page 222

Spit and Polish, But No Starch

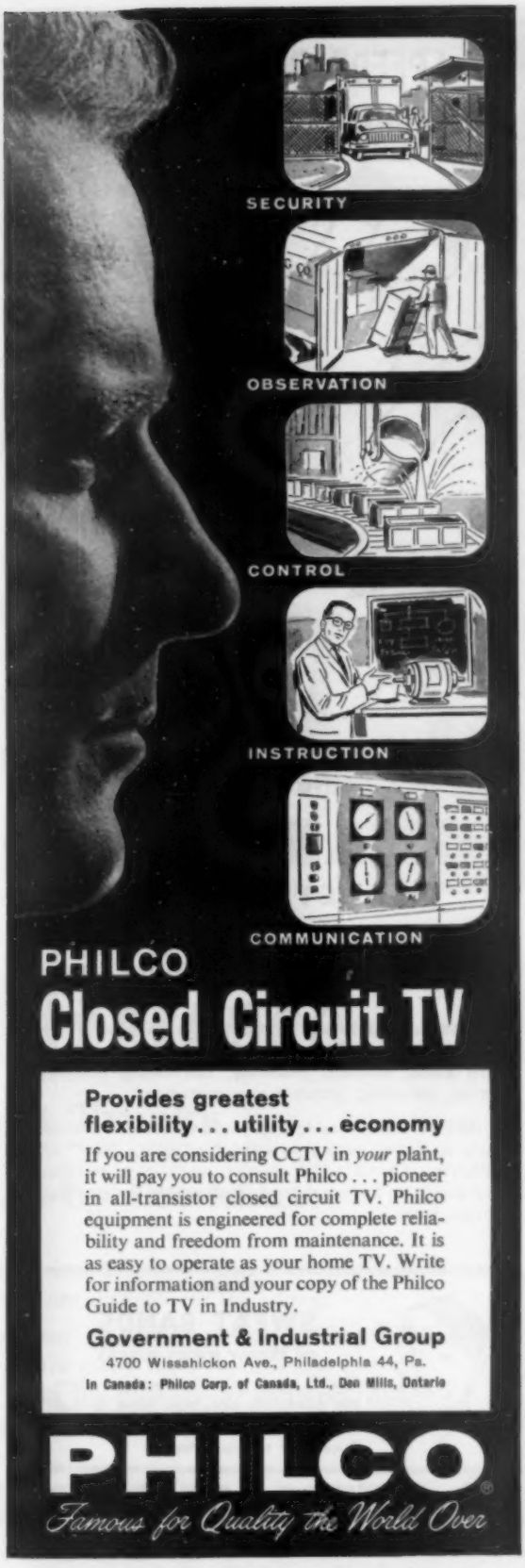
Gone with the stiff collar and high-button shoes is the rigid conduct required of office workers in a bygone era. Today's white-collar worker is informal, his conduct relaxed. A study by the National Office Management Association, Willow Grove, Pa., shows the change in attitudes. Here are nine trends revealed by the 2300 business, industrial, and service organizations polled in the United States and Canada:

1. Dress: Typical male worker is expected to report for work dressed in good taste, usually with coat and tie. In warm weather he may wear a sport shirt. In 89% of companies, no rules or restrictions govern office dress.
2. Smoking: 75% have no restrictions for either men or women.
3. Christmas parties: 65% hold them despite recent criticism.
4. Personal mail: 87% of employees receive it in the office.
5. Married women: 86% hire women with preschool children; 61% report no higher absenteeism in this group than for rest of employees.
6. Coffee breaks: 80% grant coffee breaks or rest periods.
7. Hiring of spouse: 58% do not reject application of spouse of employee because of relationship.
8. Personal phone calls: 73% permit incoming calls at all times; 66% allow outgoing calls.
9. Picnics: 40% hold them for office workers.

Behind the Barb, a Brain

Follow the sound of laughter, and it may turn out to be today's Pied Piper—the potential supervisor. He's the plant wit, whose "piping" draws around him a group of amused workers. And if his humor has a bite to it, your chances of discovering a leader in him are even better. So claim two psychologists who studied a group of 85 supervisors. Ewart E. Smith and Jacqueline D. Goodchilds of the University of Delaware observed the group attending a management-training course.

Whenever laughter broke the ranks, a record was kept of the person provoking the remark. A further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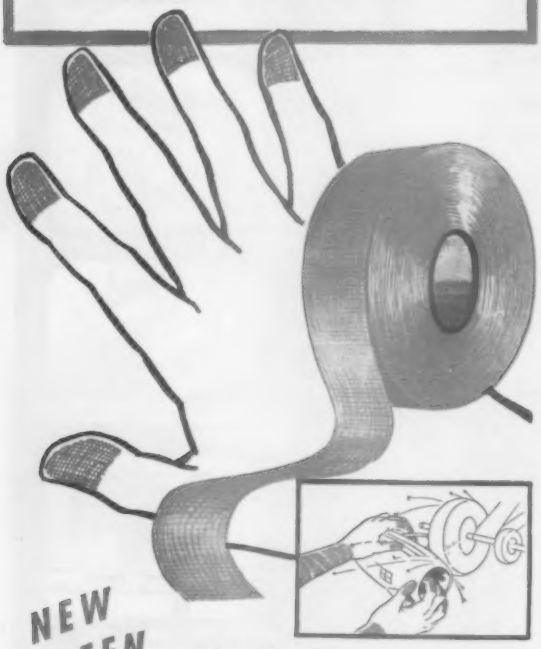
REDUCES ACCIDENTS



NEW GREEN self-adhering
GUARD-TEX
SAFETY TAPE

- Helps protect fingers, hands, forearms against cuts, burns and abrasions. Reduces eye strain — helps production.
- Promotes safety where potential hazards exist — transformer lamination, pigtailing, handling hot or sharp glass, sanding, polishing, machining, buffing, burring, grinding, punch press operation.
- Self-adhering easy to apply and remove. Conforms neatly to finger contours, without affecting "feel" or flexibility. GUARD-TEX leaves no sticky residue, color stain, or fingerprints. Indispensable in handling delicate work.

GUARD-TEX
SWEAT BANDS
at throw away prices
Elastic band holds feather-light, four-ply powerfully absorbent band in just the right place. Comfortable, efficient. Prices and samples free.

GENERAL BANDAGES, INC.
8300 Lehigh Ave., Morton Grove, Illinois

Begins on page 222

breakdown showed many of these jokes involved sarcasm and ridicule. Other tests that measured leadership qualities of the group, and the subjects' own view of themselves, added more information to the study. Finally, the group was asked to choose those among them with leadership potential. The jokesters polled more votes than the "serious-minded." Psychologists' conclusion: Wits, especially those with barbed tongues, were seen by the group as equipped for leader roles.

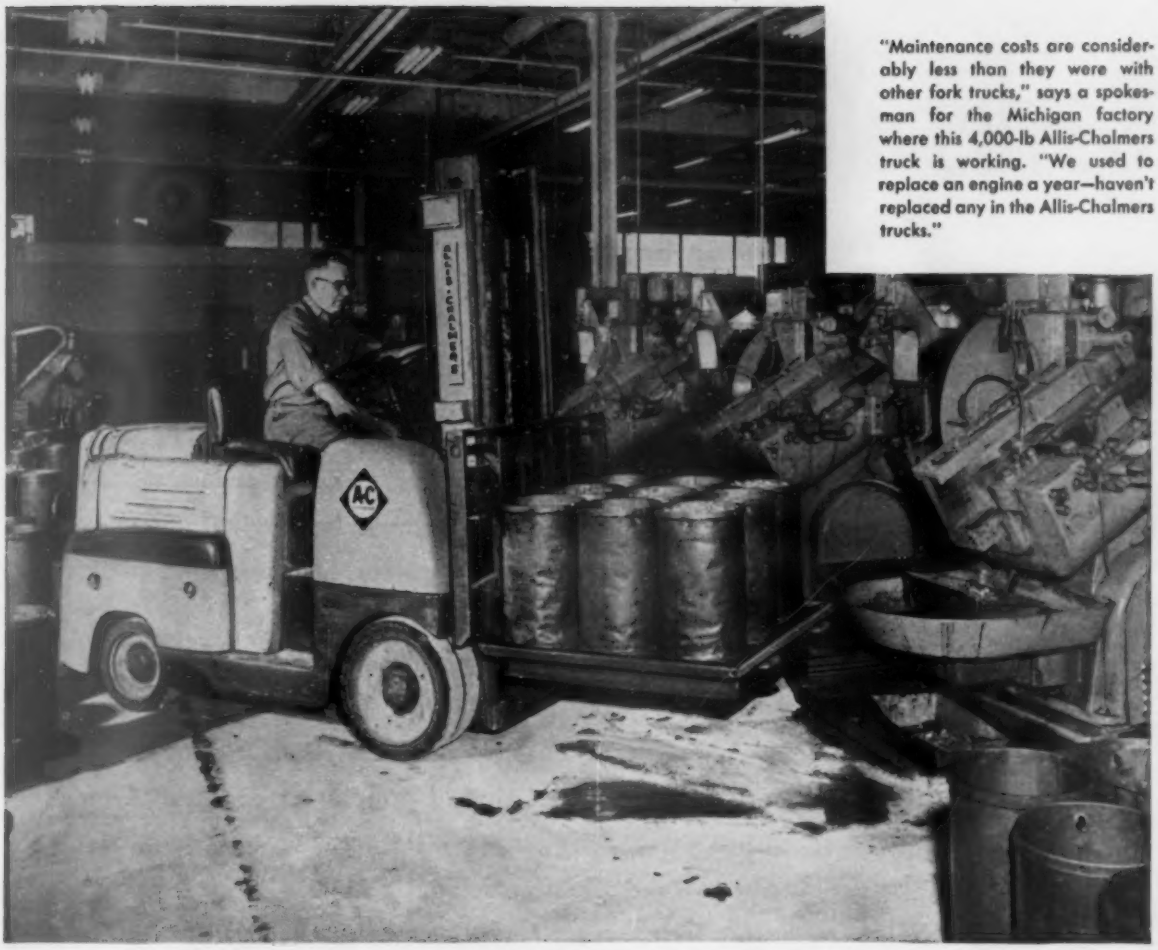
Grind Good for Grads

No slow weaning process, but a sink-or-swim strategy seems to work well with college graduates entering industry, claims James L. Davenport, a Michigan Bell Telephone personnel expert. Mistakes are made with this approach to training, but people benefit from the exposure. "And making mistakes early is a good vaccination against making more expensive ones later," says Davenport.

At Bell, trainees are given managerial assignments after a short 5-day orientation program. They tackle staff problems or supervise workers in the field. The company used to put trainees on a rotating program to expose them to all major departments in the organization. But while the company believed "our trainees are getting a look at many different functions," the grads often felt "we're going in circles."

A Wreath of Cooperation

When an employee or former employee of Sperry Gyroscope Company (Great Neck, N. Y.) passes away, flowers are sent the next day. This prompt expression of sympathy is possible through the cooperation of supervisors and employees. They are encouraged to notify the personnel department quickly in case of death, especially that of a retired employee. If the bereaved family prefers a religious token to flowers, or a donation to charity in the name of the deceased, Sperry complies. Furthermore, a company representative calls on the family to offer help on such matters as death benefits, and the like.



"Maintenance costs are considerably less than they were with other fork trucks," says a spokesman for the Michigan factory where this 4,000-lb Allis-Chalmers truck is working. "We used to replace an engine a year—haven't replaced any in the Allis-Chalmers trucks."

There's a

dollar-saving difference

in Allis-Chalmers Lift Trucks

. . . and the difference grows by the hour.

Sometimes it takes 10,000 hours or more to prove: No other lift truck can be expected to operate as steadily, as economically for as long a time as an Allis-Chalmers.

This is a conclusion reached by users in many different industries. They are users who have kept detailed records of operation and maintenance costs . . . that *prove* there is a dollar-saving difference. Many of their case histories are available for the asking.

Let your Allis-Chalmers dealer show you some of the many years-ahead design features that make the dollar-saving difference. Allis-Chalmers, Milwaukee 1, Wisconsin.

ALLIS-CHALMERS

BH-128C

For more facts Circle 791 on Reader Service Card

For more facts Circle 792 on Reader Service Card ➤

Saves on the "Lion's Share"!

Barreled Sunlight helps you cut costs on the biggest percentage of your plant painting budget

There's no denying that labor costs take a lion's share of plant paint-maintenance budgets. *At least 80¢ out of every painting dollar!* And this is why Barreled Sunlight Paints have been specially engineered — to help you make important savings in this critical area.

Fast, easy application is only one of many labor-saving advantages working in your favor when you specify Barreled Sunlight *Engineered Paints.* Their measurably greater "hiding power" means fewer passes with brush, spray gun or roller . . . far better coverage with far less paint. Also, their engineered ability to resist wear means fewer paint jobs over the years. So you not only pay less in initial labor costs, but you also pay less in the long run for materials and painting man-hours as well.

It will pay you well to learn more about the budget-balancing advantages of Barreled Sunlight Engineered Paints. Start now by sending for your free copy of our informative booklet — "HOW TO REDUCE PAINTING COSTS."

Barreled Sunlight ENGINEERED® *Paints*

FOR A BETTER LOOKING, LONGER LASTING PAINT JOB AT LOWER COST

BARRELED SUNLIGHT PAINT COMPANY
2-E Dudley Street, Providence 1, Rhode Island

☐ We're interested in cutting our plant paint costs . . . please send me your free booklet, *How To Reduce Painting Costs.*

☐ Also, at no obligation, please have your representative call me to arrange a free Barreled Sunlight "On-The-Wall" Test.

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Barreled
Sunlight
ENGINEERED
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FACTORY

IDEAS OF THE MONTH

By LEWIS K. URQUHART, Consulting Editor

(For more information, circle item numbers on Reader Service Card next to back cover)

If plant and equipment accounting is any concern of yours, you'll want to own a new brochure (*IBM*) that shows how use of data-processing machines and electronic calculators not only saves time but also paves way to analytical treatment—and management by automation. **(501)**

Foremen and supervisors find it no hardship to get and read "Management Information" (*Elliott Service*). Handsome package contains sample issues of weekly service designed to broaden their management point of view. **(502)**

Newest in portable packaged power is Activerter (*Electric Storage Battery*) which combines storage battery and transistorized converter to produce 110-volt a-c. Now maintenance crews can use their favorite power tools all over. Two models: 200- and 500-watt. Built-in charger. Price is right. **(503)**

For hot-drink vending machines we suggest two-ply all-plastic disposable cups (*Scott Paper*) with outer ply foamed for better insulation against heat transfer. China white interior has smooth, hard lip for drinking comfort. No odor, no taste, even at boiling water temperatures. **(504)**

Sample board of drive screws and nails (*Hillwood*) is 12x16 in., tells which to use where. Mounted on it are samples of 23 nails of different sizes, in six different types. Below each nail is shown number in pound. Free. **(505)**

. . . and then back to work is slogan under steaming cup of coffee on (free) 20x27-in. poster (*Kelly-Read*). Users say employees take hint. **(506)**

Tags, anyone? Choose from "The Handy Book of Tags" (*American*). You'll find samples of standard grades illustrating eight sizes available in manila, cloth, colored shipping tags. Also strings, wires, reinforcing patches, eyelets. **(507)**

Booklet of the Month, for our money, is "The Years Ahead: 1960 to 1975" (*American-Marietta*), its 36 handsomely illustrated full-color pages containing a study of motivating forces behind vast expansion that can be anticipated. And (why not?) a look-ahead at A-M in expanding economy. **(508)**

Dermatitis problems? Try Surgent. It's a hexachlorophene liquid soap (*Hysan*) reported to be "effective in killing *staphylococcus aureus*, the antibiotic-resistant strain of bacteria." Also removes toughest grime and dirt. **(509)**

Line you want is line you get when draftsmen work with Rapidograph (*Koh-I-Noor*). Non-clogging fountain pen has seven interchangeable point sections, each with refillable cartridge. Seven precision line widths. **(510)**

Color-Cork is new floor and wall material (*Gotham*). Cork, of course, burlap-backed, vinyl-coated, in 16 colors ranging from rose pink to hemlock green. Color goes all the way through, can't wear off. Rolls. Tiles. **(511)**

Folks who are fuzzy about the three classes of fires, and which type of portable extinguisher is suitable or unsuitable for each, are sure to find new fire control chart (*Kidde*) most enlightening. **(512)**

Wherever over-the-floor electric wiring seems to be best way to provide outlets, we'll settle for Electriduct (*Ideas, Inc.*). This rubber extension cord is nearly flat, hence stumble-proof. Comes in 4-, 5-, and 6-ft. lengths ready to plug in, with double outlet receptacle molded into business end. **(513)**

Medi-Prep is stainless steel unit (*General Scientific Equipment*) for first-aid rooms. Refrigerator, sink, work counter, shelves, cabinet. **(514)**

Offset in the office is all yours with new table-top duplicator (*Dick*) that gives you professional-looking copies of line drawings and halftones in black and white or color, simplifies production of systems paperwork, office forms, catalog pages, price lists, bulletins, announcements. **(515)**

If your in-plant feeding dreams envision vending machines, be sure to look at 1960 Roweboteria (*Rowe*) whose soup-to-coffee menu can include more than 100 items, in any range of prices from 5 to 50 cents. **(516)**

Wall-O-Matic is an air-powered cleaning machine (*Central States Maintenance*) for all kinds of walls. No drip. No mess. No dropcloths. **(517)**

Plant electricians will thank you kindly for pliers (*Utica Drop Forge*) with Geon vinyl cushions mounted next to cutting edges. Result: no more flying wire. Seems cushioned jaws hold cut-off lengths until pressure is released, preventing short ends from getting into the machinery. **(518)**

Metagard (*Pendergast*) fits over instep, supplements protection provided by steel toe safety shoes. Stainless steel construction, padded with heavy Neoprene cushion. Comfortable for all-day wear. **(519)**

Room too small to throw big pictures on your screen? Take off the lens and slip on a Superwide (*Buhl*). Result: one-third the throw ordinarily required —e.g., a 4-ft.-wide picture with projector only 5 ft. from screen. **(520)**

Turn the page

IDEAS OF THE MONTH . . . *Begins on page 230*
(For more information, circle item numbers on Reader Service Card next to back cover)

Like to save half the space required for mounting circuit breakers? New FJ molded-case breakers (*I-T-E*) are half as heavy, half as bulky as J-frame units—4½ in. wide by 10 in. long (as against 9x11 in.). **(521)**

You get correct lubrication of hard-to-reach conveyor trolley fittings with fully automatic, air-powered lubricator (*Aro*). Designed for easy installation in existing trolley conveyors. Operated by remote controls from floor level. Saves time and labor. Eliminates dangerous climbing. **(522)**

Home-study course of 38 lessons (*Motorola*) is for electronics technicians with enough experience to pass FCC technical license examination; covers principles of operating and servicing two-way radio equipment. **(523)**

Fotiaire is a 3-in-1 glove (*Rubin*) that protects hands at absolute zero (460 below) and at 1200 above. Surprisingly un-bulky. **(524)**

For many an odd handling job there's nothing much handier than a mobile floor crane. And the new one we like (*Colson*) has a six-directional power-lift boom that can be extended to 6 ft. beyond its chassis, lifts and spots loads up to 2½ tons. Boom can be raised as high as 9 ft. from floor. **(525)**

Turn the page

CUT CLEAN
WITH
CLEAN-CUT!
Clean-Cut 72
Mows at 8 MPH
Cut
Grounds
Mowing Time in Half!
Get a clean, even mowing job from Clean-Cut's "floating" mower units. Mowers are so maneuverable you make 90 or 180-degree turns at top speed — within the length of the Tractor.
Three riding mowers available — the Clean-Cut 72, 36 and 24 — A Clean-Cut Mower to fit your needs!
Free Literature — Demonstration!
Write today for colorful FREE "Mowing Magic" folder giving full details about Clean-Cut Mowers. Ask about a FREE Demonstration.
Clean-Cut 24 or 36
CLEAN-CUT MOWERS INC.
P.O. BOX 709
DUNBAR, W. VA.

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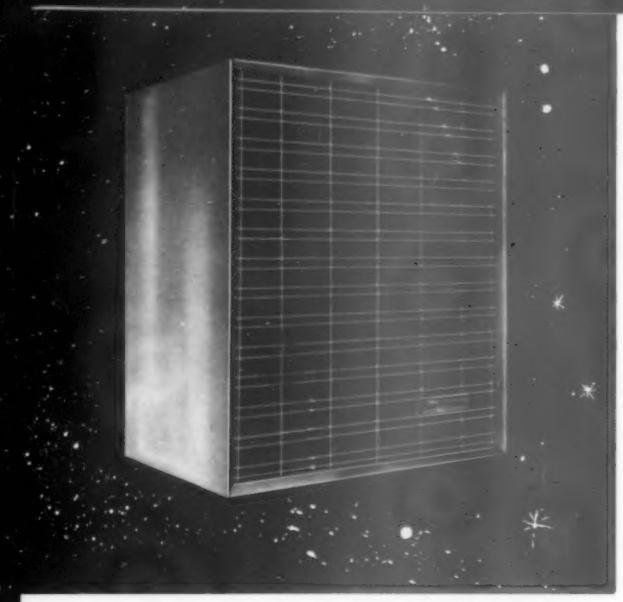
JANITROL

presents a dramatically new achievement...

67 SERIES

GAS-FIRED UNIT HEATERS

UNPRECEDENTED STYLING, PERFORMANCE AND DURABILITY TO MEET THE MODERN TREND IN ARCHITECTURAL DESIGN



provide the ultimate in quality and economy

new JANITROL GAS-FIRED

commercial & industrial heating equipment

ALL NEW! JANITROL 67 SERIES UNIT HEATERS FEATURING. . . STELLAR NEW STYLING, PERFORMANCE AND DURABILITY!

New Janitrol 67 Series Unit Heaters are unusually handsome . . . incredibly quiet and efficient. They bring you, for the first time in unit heater history, distinctive appearance you can recommend for the smartest business setting. And they offer in even greater measure the traditional Janitrol quality and dependability in heating.

Their clean, crisp "look" is a departure from the crude, cumbersome industrial appearance of yesterday. Modern machine tools, trucks and structures have evolved as attractive, functional designs. And now, Janitrol sets the pace in unit heater styling!

The draft hood opening and adjustable louvers are concealed by the beautifully styled gold-tone grille. The rear combustion air inlet permits use of a solid bottom panel . . . eliminates any possibility of obstruction to combustion air intake.

Inside, design progress is equally significant. Yet every part is proven . . . every safety feature is included. Result? Performance no other unit heater can duplicate.

Naturally, the "heating heart" of every new Janitrol is the famous Janitrol Multi-Thermex heat exchanger with this unchallenged record for durability and low maintenance: among nearly three million heat exchanger tubes produced since 1940, replacements for all causes have run less than ¼ of 1%.

Investigate the many exclusive advantages of Janitrol 67 Series Unit Heaters for jobs you specify or install. Let them help build your reputation for quality.

FEATURES THAT MAKE ALL OTHER UNIT HEATERS OLD-FASHIONED!

New "sheer look" styling—Beautiful Phoenix Beige finish • New gold-tone grille. Conceals louvers and draft hood opening • Low overall height • Automatic controls—Fully accessible • Factory-fired • Low Voltage Gas Controls—Standard • Low Voltage Sensitive Thermostat—Standard • Limit control—interrupts control circuits and shuts off fuel if unit temperature becomes excessive • Thermopilot Shut-off. Shuts off all gas, including pilot, in event of pilot flame failure • Automatic Pilot. Exclusive Janitrol low Btu. non-linting design • Quiet air delivery. Acceptable for schools and other applications where conventional units are too noisy • Motor prelubricated for 5 years • Built-in Draft Hood. Removable, provides full access to heat exchanger. Protects burners from abnormal up or down draft • Combustion air inlet. At bottom rear, through control enclosure. Controls constantly cooled by combustion air stream. Eliminates cross draft on burners • Ampli-Fire Ribbon Flame Burners. No flame contact on metal. Removable, with non-linting air shutters featuring thumb-screw adjustment.

MEET EVERY COMMERCIAL AND INDUSTRIAL HEATING NEED FROM JANITROL'S BROAD LINE

GAS-FIRED DUCT-FURNACES

Install in a duct where air is circulated by separate blower. Adaptable for use with cooling. Two sizes: 200,000 and 300,000 Btu/hr. input—may be combined to provide capacity from 200,000 Btu/hr. up, in increments of 100,000 Btu/hr. input. Six sizes, from 50,000 to 225,000 Btu/hr. in Duct 55 models.

BLOWER-TYPE UNIT HEATER

Allows air delivery from greater heights and against greater static pressures. Models with exposed or enclosed blowers. A.G.A. approved as low and high static-type blower unit heater for air delivery to duct system up to 1.0 in. W.C. external static. Heat sections factory assembled. Sizes: 300,000, 400,000 and 500,000 Btu/hr. input.

FLOOR-TYPE UNIT HEATER

Cold air drawn from floor level is heated, filtered and discharged horizontally overhead. Quiet, clean, carefree—ideal for offices, restaurants, stores, labs, etc., requiring a compact unit.

HEAVY DUTY BLOWER HEATERS

For unit heating, central heating and air conditioning. Wide range of standard blowers and motors assures correct air delivery and temperature rise in each application. Factory assembled and tested. Capacities from 250,000 Btu to 1,750,000 Btu/hr. input.

HORIZONTAL OIL UNIT HEATER

For suspension overhead. Saves floor space. Compact, efficient, low-maintenance design clean and quiet in operation. May also be used to feed duct system. Choice of sizes from 84,000 to 250,000 Btu/hr. output to meet all needs.

helpful data for **ARCHITECTS, CONTRACTORS AND ENGINEERS** *write collect today* for complete information on Janitrol units for heating with clean, economical gas in buildings of every type. There's no obligation.

JANITROL
HEATING AND AIR CONDITIONING
A Division of Midland-Ross Corporation
Columbus 16, Ohio • In Canada: Moffats Ltd., Toronto 15

Also Makers of Surface Industrial Furnaces, Kathabar Humidity Conditioning, Janitrol Residential Heating and Cooling Equipment.

More for your lubrication dollar is theme of timely booklet (*Mobil*) describing 10-point program of correct lubrication. Tells how 8 leading companies, each in a different industry, save $234,435! **(526)**

No gear shifting. New fork truck (*Mobilift*) has automatic drive. And it's designed for stand-up-and-control operation. One step up, and driver is ready to go; one step off, and truck is locked (driver has no parking brake to set). Looks like a real material-handling time-saver. **(527)**

Office layout kit (*Planoramics*) is a handy-dandy tool to reach for and find. Has 20x50-in. plastic grid. Over 1200 pieces. Free sample. **(528)**

The well-dressed plant fireman wears an emergency signaling horn (*Falcon*) hitched to his belt. Pint-sized cylinder of Freon 22 (non-toxic, non-flammable) supplies power. Horn gives with high-pitched blast. **(529)**

Audio-visual aficionados looking for inexpensive film packages are sure to go for new 8mm sound projector (*Kodak*). Commentary is recorded by speaking into microphone provided with projector as film is being run. Operator can erase, re-record, or play back sound at will. **(530)**

ARE YOUR ASSEMBLY LINES AS MODERN AS THE BUILDING THEY ARE IN? THEY CAN BE . . . WITH ALDEN WORK CENTERS.

The Alden Work Center permits a unit by unit creation of an integrated assembly line of any length, for either manual or automatic manufacture, all from standard "Building Block" components. It insures the use of most efficient methods . . . fast flow of parts and materials . . . proper stock control and minimum human effort.

Alden Basic Work Center Frame (may be expanded to any desired length by adding units). Note Alden Power Channel which supplies all plant services to each work position — gasses, electrical, liquids.

Alden Work Center assembly line with conveyors and lighting . . . made up completely of Alden Systems components.

Individual work taps may be slipped into or out of the frame as desired.

You can profit by having the ultimate in line flexibility constantly available . . . by operating in less space . . . increased line efficiency . . . reduced in-process inventories . . . reduced engineering, supervision, direct labor, maintenance and set up costs.

Write today for the new Alden Systems Handbook which includes catalog and price information.

ALDEN SYSTEMS CO. ALDEN RESEARCH CENTER 9 WASHINGTON STREET WESTBORO, MASS.

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NEW

RUBBER ENCASED PENDENT SWITCHES

for electric hoist control

Now available in 2, 4, 6, button models.

FREE ILLUSTRATED LITERATURE on request.

always SAFE!

Completely enclosed *Hycar housing is 100% watertight and electrically insulated for maximum operator-safety. Lightweight, corrosion-proof *Hycar molded enclosure.

always WORK!

Precision snap-action switches have been subjected to over ¼-million operations without mechanical or electrical failure. Switches completely sealed from dust, dirt or grime can never cause breakdown.

* *Hycar: New B. F. Goodrich Chemical Co. Synthetic Rubber Compound*

CD 100.1R

JOY ELECTRICAL PRODUCTS DIVISION

1245 Macklind Ave., St. Louis, Mo.

Exec. Offices, Henry W. Oliver Bldg. Pgh., Pa.

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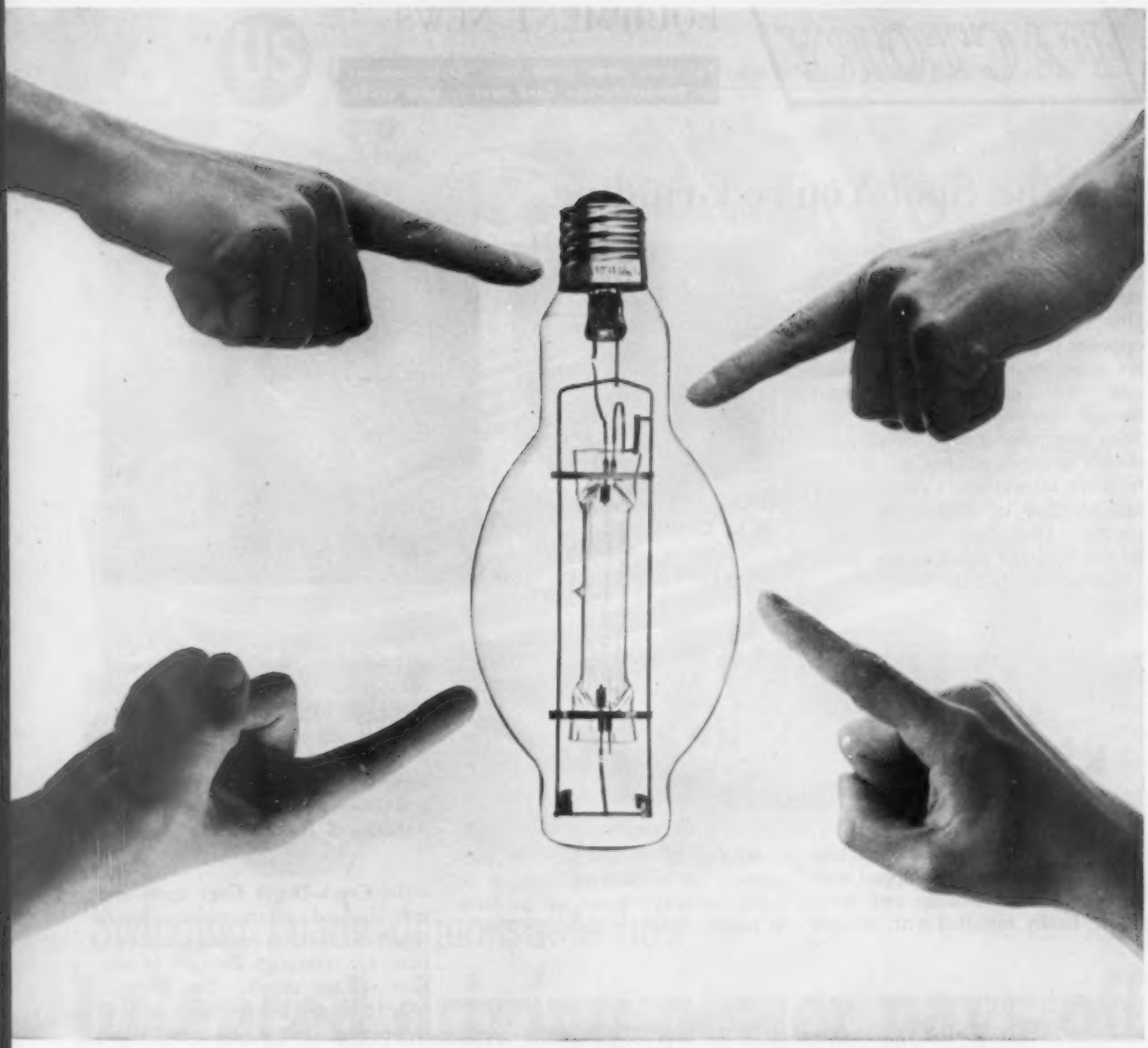
Mercury lamps may look alike

These Mercury lamps look alike and cost about the same, but one—the Westinghouse Lamp—will deliver more light initially and maintain this high light output longer. It is your most economical choice for industrial and commercial lighting and incorporates all 4 outstanding improvements listed below.

1. Lifeguard™ arc tube to improve lumen maintenance. Even after 10,000 hours of use, these lamps will still give 85% of their initial light output. *This means that 2½ years after you install Westinghouse Mercury Lamps, your plant or streets will have almost the same high level of light as when the lamps were new!*



. . . but four differences make one a better buy!

2. New design electrodes lock in the emission material and insure long life and easier starting.

3. Weather Duty™ construction. Special glass is resistant to thermal shock and corrosive fumes. Moisture, industrial fumes, even snow and rain can't harm these Westinghouse Mercury Lamps.

4. Hi-temp silicone cement holds bases tight for life . . . actually gets stronger as the lamps burn. No drop-outs. Westinghouse even date-codes its mercury lamps so you can check performance.

No matter what type or wattage of mercury lamps you use, you will get more value and light for your money—plus longer, trouble-free service—by specifying and insisting on Westinghouse Mercury Lamps. Westinghouse makes the most complete line of mercury lamps in the industry . . . 100 to 3000 watt sizes . . . in clear, color-corrected and reflector types. Contact your authorized Westinghouse lamp agent or nearest Westinghouse sales office.

YOU CAN BE SURE...IF IT'S Westinghouse

WESTINGHOUSE LAMP DIVISION, Westinghouse Electric Corporation, Bloomfield, N. J.

For more facts Circle 798 on Reader Service Card

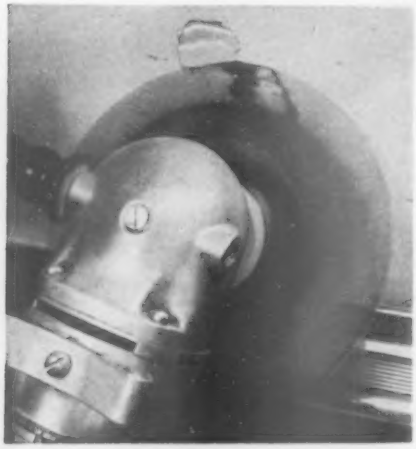
FACTORY EQUIPMENT NEWS

For more about these items, circle numbers on Reader Service Card next to back cover.

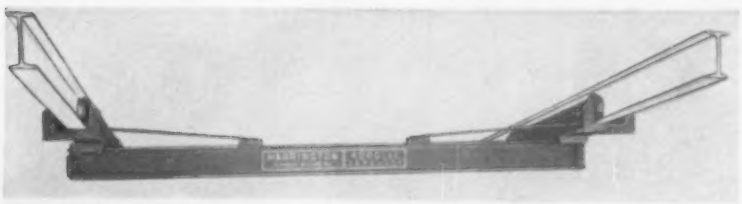
See the Spot You're Grinding

Reduced dwell time, complete accuracy, no overgrind. That just about wraps up advantages of "Vizi-Disc," a grinding wheel with two opposite edges cut off (right photo). As it rotates, a full inch at outer edge (where all grinding is done) becomes transparent (far right). With workpiece always in full view, there's no need to stop grinder for frequent inspection. Contour work and blending of welds is fast and precise. Disks are 7- and 9-in., in standard grit assortments. *Behr-Manning Co.* (Circle 397).

DISK'S ODD SHAPE . . .



KEEPS TARGET IN VIEW



398—Packaged Cranes, complete for quick assembly, are shipped with all parts except I-beam and drive shaft. Easily installed with wrench —no drilling or welding. In top-running or underhung models to 5-ton capacity. Saves up to 50% in freight costs. *Harrington Co.*

399—Induction Motors, open frame, ½ to 125 hp., with thermoplastic encapsulated windings, resist water, oil, abrasives. Sealed bearings and conduit box. Vinyl-based primer and acid resistant paint inside and out. Cost same as standard open motors. *Lincoln Electric Co.*

400—Shelf Truck is battery-operated with drive and steering controls at each end for easy operation in narrow aisles. Shelves come in widths, lengths, and heights to suit product. For handling small parts in tote pans, order selecting, etc. *Lewis-Shepard Products, Inc.*

401—Pallet - Racking Structurals convert standard pallets into low-cost portable racks without bolts, nuts, or screws. Racks, with loads to 12,000 lb., can be stacked ceiling-high, and handled with lift trucks and dollies. Store compactly. *Union Asbestos & Rubber Co.*

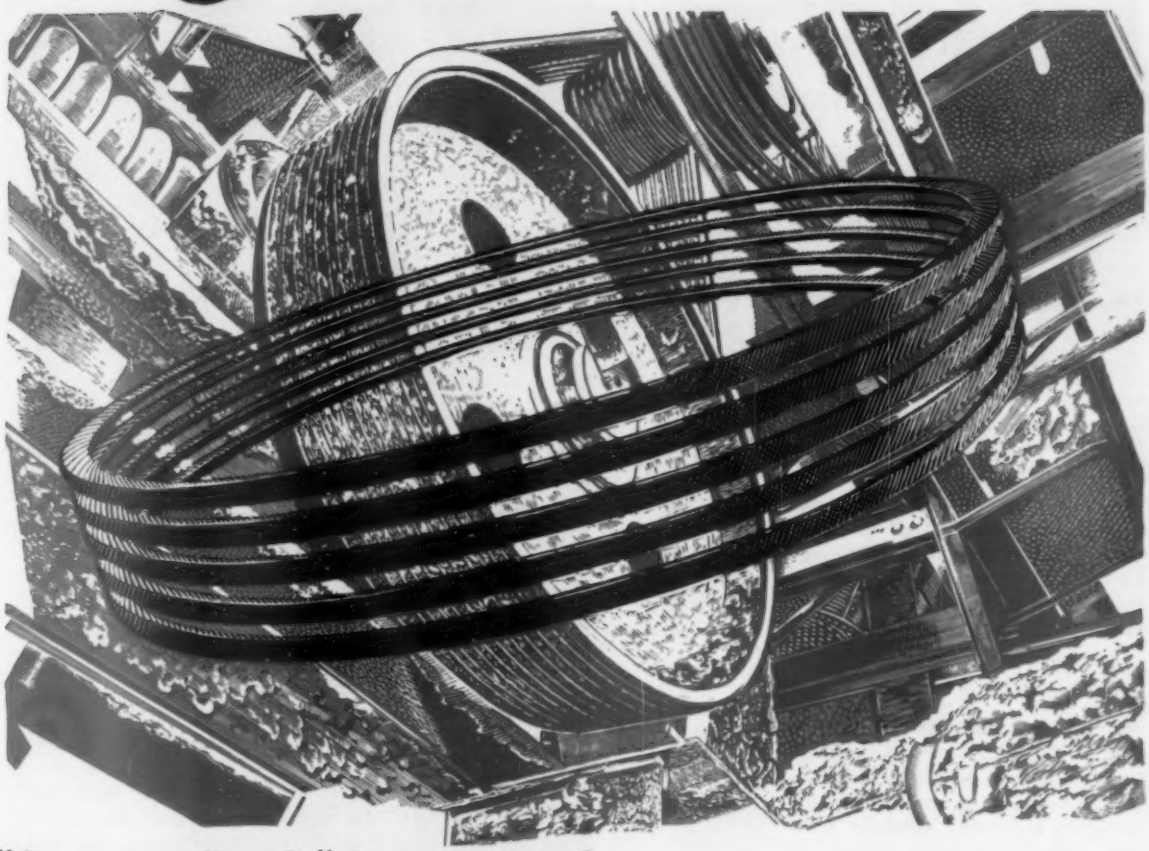
402—Crack-Depth Gage spots and indicates on direct-reading meter depth of cracks in forgings, castings, bars, etc. (through changes in surface voltage drop). Two ranges: 0-3/16 in. and 0-1 in. Needs no skill to operate. 110 v., 60 cycles. *Iroquois Tool Supply Co.*

403—Chemicator eliminates weighing and mixing chemicals to feed into circulating water systems of cooling towers and evaporative condensers. Compact, lightweight, automatically feeds right chemical in exact amounts. Chemicals come in refill tube. *Erlen Products Co.*

404—Vibration Monitor uses pneumatic control to spot malfunction of rotating and reciprocating machines. Needs no electric power. Excessive vibration from bearing failure or broken piston rings triggers shut-off equipment. *Robertshaw-Fulton Controls Co.*

Turn the page

U. S. ROYAL V-BELTS from the Power Unlimited complete belt line



"Swinging Loads" demonstrate how

balanced driving power pays off

The flywheels on stone-crushing machinery at the Bethayres Concrete Products Company in Bethayres, Pa., put V-belts under a "tremendous strain."

Not only must each set of 8 U. S. Royal V-Belts driving the flywheel operate under extremes of abrasive conditions, it must also operate on constantly changing centers. As incompressible foreign matter enters the driven rollers, they swing or oscillate to allow passage. The result is constantly changing tensions under pressures amounting to many tons!

Yet even with this constant change in tensions and the severity of the abrasive conditions, the U. S. Royal V-Belts continue to share the load for an average of one year of rock-breaking service.

The C-210's used on these V-sheave to flat-surface drives, like all of the approximately 250 "U. S." belts in 48 different sizes used throughout the Bethayres plant, have a built-in advantage. "Balanced driving power"... the result of specially developed manufacturing equipment that automatically controls weight, dimensions, density, length, and tension members... helps provide a uniformity, toughness, length stability and true-running smoothness that have paid off in job after job, plant after plant the nation over.

Put balanced driving power to work in your own operations. See your "U. S." Power Transmission Distributor for full stocks and expert service.

U. S. Royal V-Belts and engineering assistance for these drives supplied by "U. S." Distributor Lindsay-Oberholzer of Philadelphia, Pa.

Visit Booth 1324, Design Engineering Show, New York Coliseum, May 23-26.

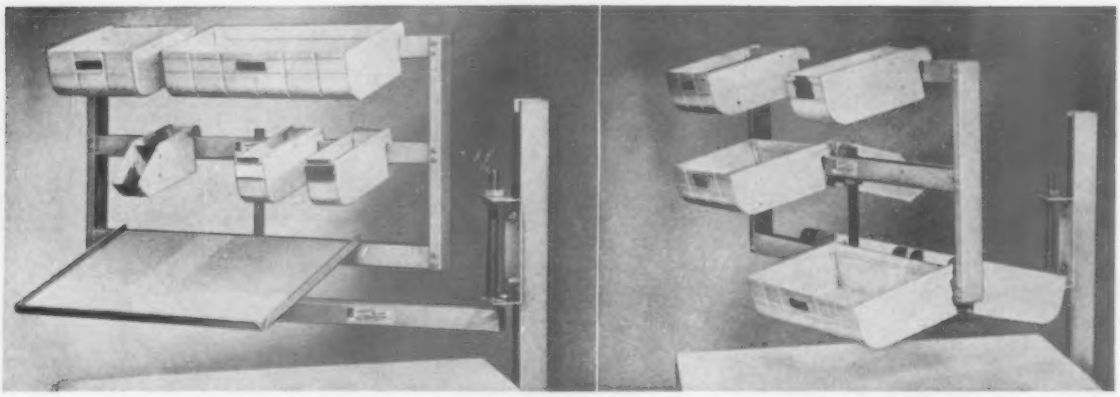
Mechanical Goods Division

United States Rubber

WORLD'S LARGEST MANUFACTURER OF INDUSTRIAL RUBBER PRODUCTS

Rockefeller Center, New York 20, N.Y. In Canada: Dominion Rubber Company, Ltd.

For more about these items, circle numbers on Reader Service Card next to back cover.



Saves Bench Space, Puts Parts at Fingertips

Here's a parts rack that takes the stretch and bend out of assembly work while boosting output. It stores all types of components in hanging containers that fit over rails of rack. Helps keep top of assembly benches clean and clutter-free. Each rack has over 10 ft. of rail for containers. Up to 66 different components go on a single rack.

Containers attach from both sides for quick, easy picking or reloading. Rack swivels a full 360 deg., putting parts in constant reach of operators. Available for mounting on stanchion, or on horizontal channels at rear of bench. *Products for Industry, Inc.* (Circle 405).

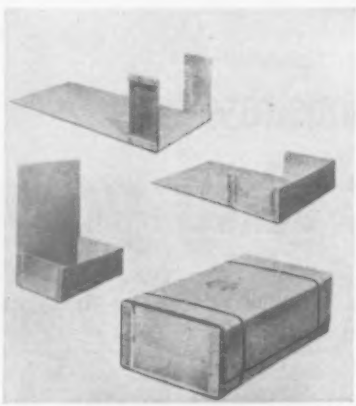
406—Annunciator (with flexible plug-in modules) provides supervisory contacts on all circuits for control. Adapts to any annunciator operating sequence. Monitors pressure, heat, liquid levels, opening of circuit breakers. *Edwards Co.*

407—Drum Faucet doesn't leak with any chlorinated solvent except methylene chloride and chloroform. Stainless steel internal spring is nonclogging, rustproof. Red handle identifies faucet. *Foster Aluminum Alloy Products Corp.*

408—Safety Wheel Block has slightly longer outermost calks or spurs to provide instant grip for heavy trucks and trailers. As load pressure increases, middle calks grip pavement for positive holding. *Calumet Steel Castings Corp.*

409—Limit Switch is sealed to prevent seepage of oil, moisture, abrasive grit. Controlled tolerances produce identical operation of switches. Interchangeable parts. Operating head mounts in any of four positions. *Cutler-Hammer.*

Low-Cost, Make-'em-Yourself Containers



When short production runs turn out products of various shapes and sizes, you have packaging problems on your hands. Answer may be this triple-corrugated board that can be cut to your needs. Pre-cut board is wrapped around two wooden box ends to form high-strength container with low tare weight at lower cost than wooden boxes. One man can assemble with simple cutting tool, screw- or box-type nails or staples. Strapping completes the job. Board comes in lengths to 25 ft., widths to 75 in. *Tri-Wall Containers, Inc.* (Circle 410).

Counts Large Parts

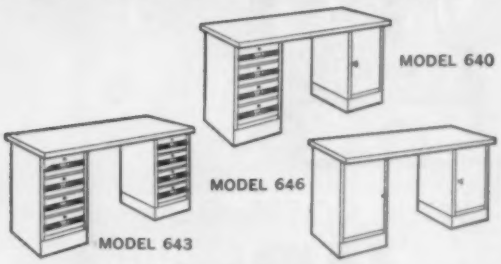
Large items (small ones too) are easily weigh-counted with this variable ratio scale. Movable variable and fixed ratio pans, used together or separately, count pieces up to 20,500 lb. Size of pans limits size of part, but weight of part may vary from 2 to 8 oz. Scale is sensitive to one 2-oz. piece. *Toledo Scale Corp.* (Circle 411).

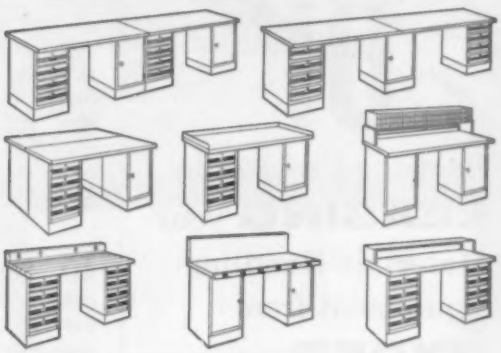
Turn the page

HALLOWELL

UNIT WORK BENCHES

more efficient—for every job





HALLOWELL Unit Work Benches, with interchangeable accessories, allow you to rearrange or add units for changing work requirements. Work flows smoother . . . your shop stays neater . . . when you equip with rugged, long-life Hallowell Benches. Widest selection of sizes and accessories in the industry. Order from your local distributor's stock. No long wait for delivery. Mail coupon for complete catalog.

COLUMBIA-HALLOWELL Division SPS
Jenkintown 11, Pa.
Please send me the Hallowell Full Line Catalog.

NAME_____ TITLE_____
(Please Print)

FIRM_____

ADDRESS_____

CITY_____ ZONE_____ STATE_____

COLUMBIA-HALLOWELL Division **SPS** JENKINTOWN 11, PA. • SANTA ANA, CALIFORNIA

where reliability replaces probability

For more facts Circle 800 on Reader Service Card

WHEN THIS UNIT IS

DOWN

YOUR COSTS GO

UP

Beat the Problem by **LEASING** your Materials Handling Equipment from

RYDER

If you're tired of taking a beating on costly "down-time" take a look at the Ryder lease, a real knockout of a solution.

Your capital is released for other needs. All you do is budget one economical monthly lease rate* . . . let Ryder do all the WORRYING about "down-time," obsolescence, and costly repair bills.

It won't cost you anything and it could save you some big money by writing today for the "Full Story" folder from...

RYDER TRUCK RENTAL INC.

P.O. Box 33-816, Dept. B-23, Miami, Florida

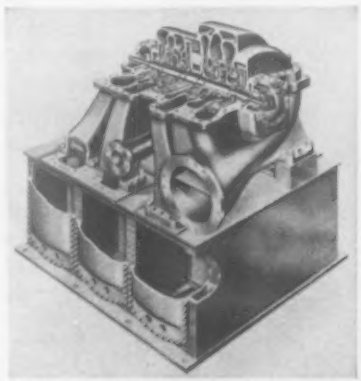
DIVISION OF RYDER SYSTEM

*This rate can cover a complete Ryder leasing package including truck and car rental, if you wish.

For more about these items, circle numbers on Reader Service Card next to back cover.

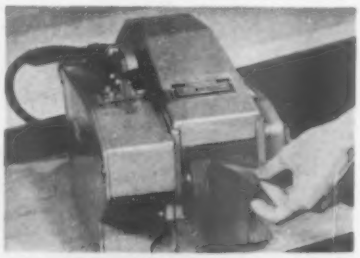
412—Reinforced Wooden Pallet costs little more, lasts twice as long as standard pallets. Has two- and four-way entry, no-snag construction. It's reinforced with ¾ x 0.035-in. plastic coated steel strap that bends well and can be nailed. *Signode Steel Strapping Co.*

413—Midget Air Cylinder is small, powerful unit for handling light-duty and "gang-type" air applications, such as jigs and fixtures, or transfer and special-purpose machines. Has 1-in. bore for pressures to 125 psig. Six models, 1 to 12-in. strokes. *Scovill Mfg. Co.*



414—Centrifugal Air Compressor features integral intercoolers between each stage of compression for high efficiency. Needs little floor space. Vibration-free operation—no costly foundation blocks. In 1000 to 8000 bhp., 5000- to 38,000-cfm. capacity. *Clark Bros. Co.*

415—Compressed Air Filter uses improved baffling to achieve 100% liquid removal. Transparent plastic bowl resists fatigue under cycling load to provide added safety. No tools are required to clean unit quickly. Available in pipe sizes of ¼ to ½ in. *C. A. Norgren Co.*



416—Tape Dispensers, in 14 models, automatically deliver preset lengths for fast application. Operate by pushbutton, switch, or hand. Save time and tape. Unexposed blades prevent injury. Connect to plant airline. *Minnesota Mining & Mfg. Co.*

417—Wire Tote Boxes have side drop door for easy removal of small parts and material without unstacking boxes. Keyhole locking device and hinges permit quick assembly or folding flat when not in use. Takes little storage space. Needs no tools. *Palmer-Shile Co.*

Turn to page 248

GENERAL ELECTRIC
Offers a Complete Line of

ADJUSTABLE-SPEED DRIVES

- *MECHANICAL*
- *ELECTRIC*
- *ELECTRONIC*

TO MEET EVERY APPLICATION REQUIREMENT

Horsepower
1/4 to 1250

TIMED OR CURRENT LIMIT
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OPERATES FROM AC POWER SOURCE

R. P. M.
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SPEED RANGE
Up to 200:1

SPEED REGULATION
10% to 0.1%

Constant HP
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Or Both

Remote Preset Speed Control

SELECT YOUR DRIVES *from*
General Electric's Complete Line
Shown on the Following Pages

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GENERAL ELECTRIC *Adjustable-Speed Drives Offer* *A Great Opportunity*

POLYDYNE® DRIVE

Modern, a-c mechanical drive. ¼–25-hp. Speed range to 10:1. New "Equalizer"‡ provides smooth manual or automatic speed control. Produced by Gear Motor & Transmission Components Dept., Paterson, N. J. Write for Bulletin GEA-6806*.

‡ Pat. Pending.

THYMOTROL† *SPEED VARIATOR*

High quality electronic drive. ¾–10-hp. Wide speed range. Small, lightweight. General Purpose and High Performance types. Write for Bulletin GEA-7018 and GEA-7019*.

KINAMATIC® *Speed Variator*

Industry's most versatile electric drive. 1–500-hp. Features Kinamatic motor-generator conversion. Speed range up to 200:1. Precise regulation. Regeneration. Wide variety of power unit, motor and control modifications available. Write for Bulletin GEA-6643*.

Industry's most complete line of modern packaged drives for every performance level, every price range

General Electric adjustable-speed drives are available for every performance level, every price range to help you boost output, improve quality, increase machine flexibility, reduce installation costs, cut your maintenance budget, add substantial profits to your business.

To make possible these advantages, your General Electric sales engineer is backed by an experienced team of adjustable-speed drive specialists—men who work constantly to help you get more out of your machines.

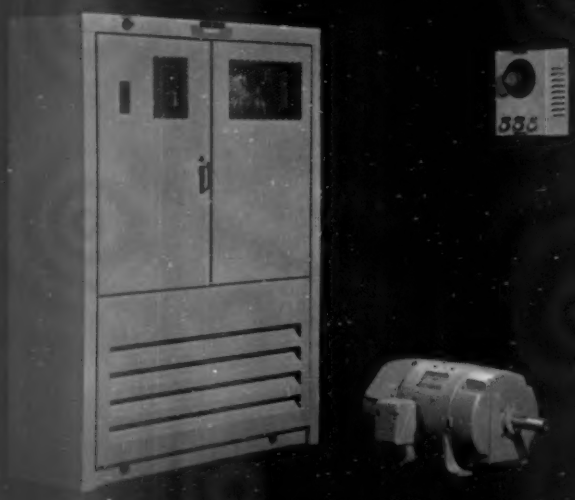
They offer an unbiased, analytical evaluation of your requirements—recommend the adjustable-speed drive that meets the demands of your application most completely and economically.

GENERAL ELECTRIC

to Modernize for Increased Profits

KINATROL✣ SPEED VARIATOR

Outstanding packaged drive value. Compact, versatile eddy current coupling. 3–100-hp. Stepless speeds 1½:1 to 17:1. 2% speed regulation. For complete information write for Bulletin GEA-6885*.



Parmatic SPEED VARIATOR

Power amplistat conversion features hermetically sealed silicon rectifiers. 1–200-hp. Speed ranges to 200:1. Lightweight, quiet and vibrationless. Field proven. Write for Bulletin GEA-7012*.

Write to Section 821-4, General Electric Company, Schenectady 5, New York.

In Canada, write Canadian General Electric, Peterborough, Ontario.

✣ **Trademark of General Electric Company.**

RESEARCH

In product research, G.E. invests more than three times the industry average. You benefit from the most modern features in your G-E drive.

ENGINEERING

General Electric industry and application specialists, familiar with your production process, assure proper selection and design of G-E adjustable-speed drives to meet your specific application requirements.

MANUFACTURING

Skilled G-E workers, modern production facilities, standardized components and latest testing methods combine to give you high-quality, adjustable-speed drive equipment, shorter delivery time, lower prices.

SERVICE

G.E.'s service network offers three-way 'round-the-clock' assistance: start-up service, productive maintenance assistance and complete repair service.

MD ARMORED MOTORS

Industry's most preferred d-c mill motor. 500 to 625-hp. Write for Bulletin GEA-4654C*.

KINAMATIC® D-C MOTORS

Most modern, versatile d-c motor for adjustable speed. 1 to 200-hp. Write for Bulletin GEA-6335*.

AMPLIDYNE POWER AMPLIFIERS

Fast response d-c power source with flexible output characteristics. Write for Bulletin GEA-4053B*.

PLUS . . . industry's most complete line of drive components for both general purpose and special industry application

To learn more about the modern capabilities of G-E packaged drives and components, call your nearby General Electric sales engineer. ADJUSTABLE SPEED, a new booklet which outlines G.E.'s complete line of modern packaged adjustable-speed drives, is also available to help you modernize for profits. Ask for Bulletin GEA-6999*.

**** Write to Section 821-4, General Electric Co., Schenectady 5, N. Y. In Canada, write Canadian General Electric, Peterborough, Ontario.***

DIRECT CURRENT MOTOR & GENERATOR DEPARTMENT

GENERAL ELECTRIC

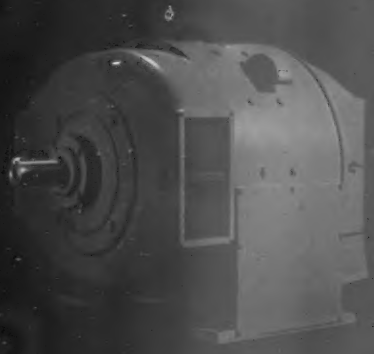
ERIE, PENNSYLVANIA

HEAVY DUTY M-G SETS

Reliable power conversion for main, auxiliary and process line drives

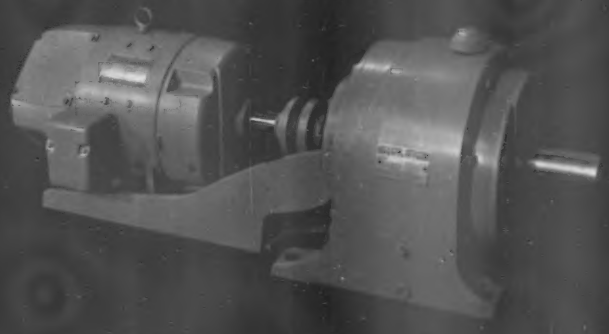
CD-1000 D-C MOTORS

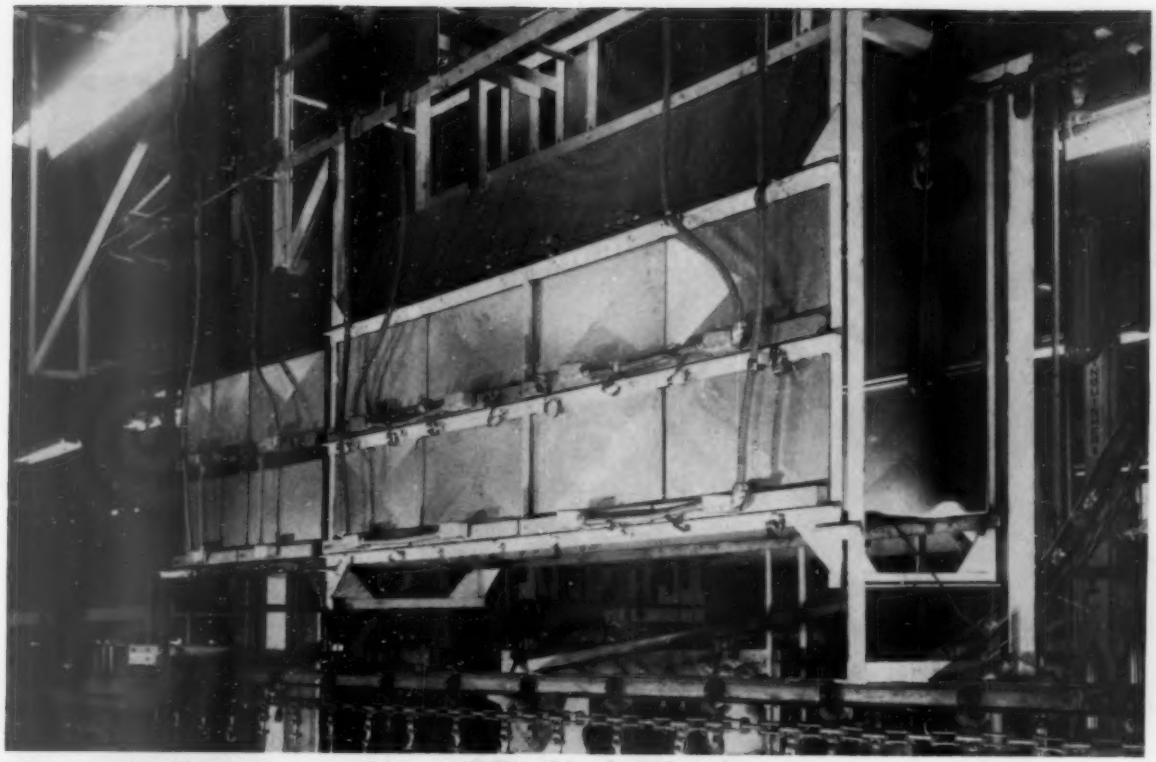
Performance proved. Quality designed. 250 to 1250-hp. Write for Bulletin GEA-5497A*.



ALL-MOTOR GEAR-MOTOR

A-c or d-c. 1 to 75-hp. Simplified maintenance. Produced by Gear Motor & Transmission Components Dept. Write for Bulletin GEA-6704*.





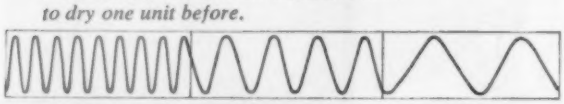
300% more work per kilowatt at American La France with PYREX far infrared panel heaters.

AMERICAN LA FRANCE DOUBLES DRYING SPEED, CUTS POWER IN HALF WITH **FAR INFRARED**

American La France puts 28 different enamel hues on its fire extinguishers . . . try drying *that* many colors with conventional heating and meet a production schedule.

They were able to achieve these amazing results when they found out that PYREX® Panel Heaters emit color-blind *far* infrared energy:

Power consumption cut 50%
Conveyor speed accelerated 100%
Four units dried with the kilowatts used to dry one unit before.



VISIBLE RED LIGHT Does practically no heating.

INFRARED The so-so area where conventional heaters work.

FAR INFRARED Here's where the work really gets done efficiently.

THE DIFFERENCES BETWEEN FAR INFRARED AND CONVENTIONAL INFRARED MIGHT SOLVE YOUR HEATING AND DRYING PROBLEMS Far infrared is color blind. All colors absorb energy and dry at the same rate. Far infrared heaters operate at lower temperatures, so there's no chance of scorching or blistering your product. The way we produce them, far infrared heaters take only a 10% current surge. There is practically no reflection of long-wave-length heat, so efficiency leaps as high as 90%.

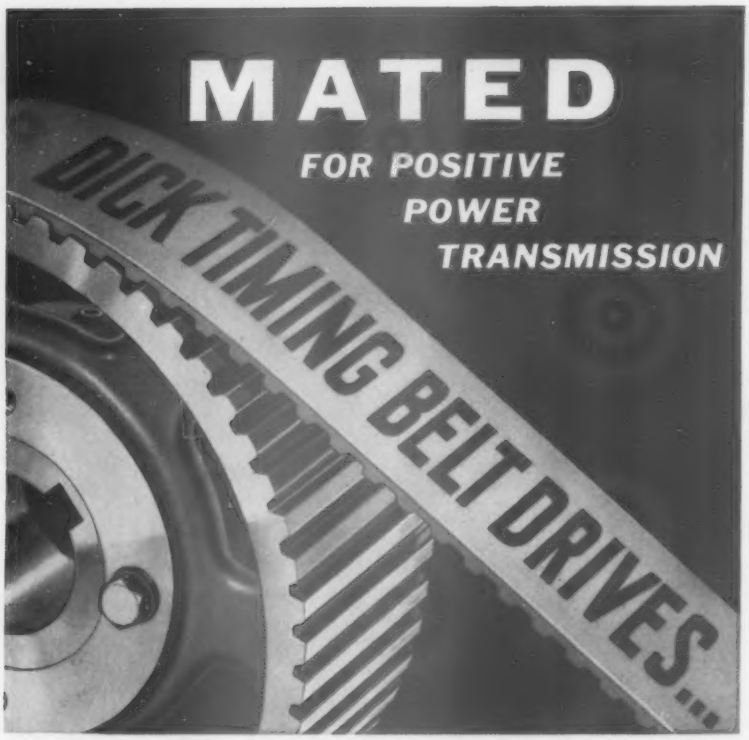
PYREX PANEL HEATERS like those shown are useful where you want particularly uniform heat over a wide area. They have no hot or cold spots. Each is self-contained and ready to install.

VYCOR® TUBULAR HEATERS should be used where you want fast heat-up. They take only three minutes to reach peak temperature. Resistance coils heat the glass; the glass emits the energy. A triple-reflector design focuses heat directly on the work. Also self-contained, ready to install.

NEW BULLETIN covers both PYREX and VYCOR heaters, how they work, design and installation details, specifications. For a copy, write to Plant Equipment Sales Department, 23 Crystal Street, Corning, N. Y.

CORNING GLASS WORKS

CORNING MEANS RESEARCH IN GLASS

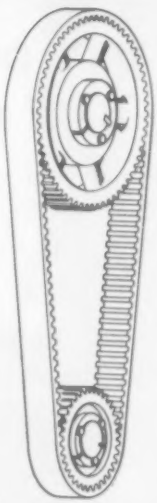


Money-Saving Answer to Many Drive Problems

Rugged nylon faced neoprene teeth silently grip the mating sprocket, and give the revolutionary power transmission action of Dick Timing Belt Drives. When designing a machine, or selecting a drive, check their advantages, including:

Positive, Non-Slip Transmission of Power—No Lubrication—Minimum Friction and Backlash—Constant Angular Velocity — Compact Design — Quiet, Lightweight — Wide Speed Range—Economical Operation.

Made in range from sub-fractional h.p. to heavy-duty drives of 600 h.p., and more. Belts reinforced with steel cable. Dick "QD" pulley hubs give a solid grip on the shaft, provide for easy installation and removal. Send coupon for engineering manual containing complete information.



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Totowa, New Jersey

Yes . . . I would like my free copy of your new engineering manual on Dick Timing Belt Drives.

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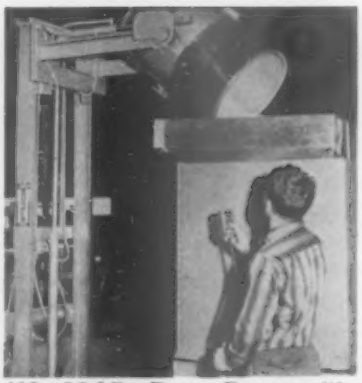
POSITION.....

FACTORY/EQUIPMENT NEWS

Begins on page 238

For more about these items, circle item numbers on Reader Service Card next to back cover.



418—Mobile Drum Dumper lifts to 72 in., then inverts loads up to 750 lb. a full 180 deg. Handles liquids, dry chemicals, metal parts. Hydraulically controlled — operator can start or stop operation at any point. Other models with dumping heights to 110 in. *Uhrden, Inc.*

419—Combination Starter line achieves extra safety with new disconnect switch and door-closing mechanisms. Door can't be accidentally opened with switch on. Switch position can't be mistaken when door is open. In NEMA 12 dust-tight enclosures. *Square D Co.*

420 — Assembly-Time Calculator automatically estimates manufacturing time of electronic and electro-mechanical assemblies. Sliderule-type instrument gives fast answers to problems that used to need hours of hand and mechanical computation. *Manufacturing Laboratories.*

Turn the page

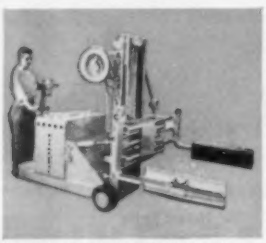
Look at all these things a *Transporter* can do!

Here are 8 cost-cutting ways Automatic's Standard Attachments can turn Transporters into Specialists

These specially designed standard attachments can add job flexibility to your Transporter Stacker. Now, a variety of jobs can be performed at considerable cost savings.

HYDRAULIC SCOOP...for handling loose materials can be furnished as a removable attachment.

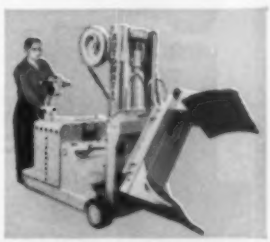
REMOTE CONTROL MAST permits operator to ride up and down for order picking or maintenance work by pushing button on carriage. Platform folds back to permit normal use of forks.



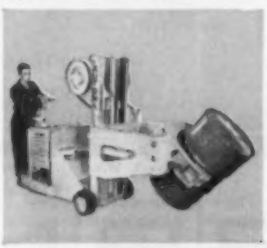
UTILITY CLAMPING DEVICE...Clamp arms can be attached to forks for handling cartons, etc. Clamp arms can be removed to handle pallets.

MECHANICAL GRAVITY DRUM DUMPER...Removable attachment to fit on forks.

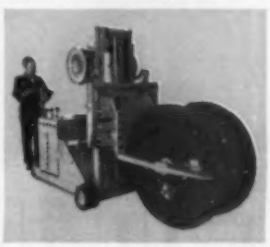
GOOSENECK CRANE ATTACHMENT...for items too bulky or too irregular in shape to be palletized.



REVOLVING PAPER ROLL CLAMP ...handles rolls vertically or horizontally...revolves 360° right or left.



HYDRAULIC DRUM HANDLER... picks up and carries any standard drum ...180° controlled forward dumping.



CABLE REEL HANDLER...lifts and transports wire and cable reels.

First in Imagination...

First with Reality

AUTOMATIC®

AUTOMATIC TRANSPORTATION COMPANY
Division of the Yale & Towne Manufacturing Company
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Please mail me the data indicated below

- ☐ "Transporter Facts and Factors"
- ☐ Descriptive literature on special attachment for the following type of work. . . . . .

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DURANT

Your answer to ACCURATE, HIGH SPEED COUNTING by REMOTE CONTROL

ELECTRIC COUNTERS

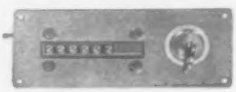
There's a standard Durant Electric Counter to fit practically any industrial application . . . enabling you to bring modern electric counting to your PRODUCTION, MACHINES or AUTOMATION METHODS.

Durant's "HIGH VISIBILITY", with clean-cut legible figures set high up and close to the window, show the exact figure at a glance. Many Durant fully enclosed Electrics have been performing accurately and dependably under varying conditions for years and years — giving the reliability so necessary in a counting operation.

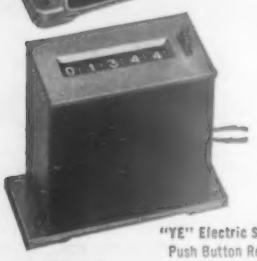
"Y" Electric Series
(Model 6-Y-1-MF)
1000 CPM

"CS" Electric Series
(larger size — larger figures)

Ideal for PANEL MOUNT
(placed and mounted from front) on machine, or at control center



Tumbler Lock Key Reset for "tamper control"



"YE" Electric Series
Push Button Reset
(Model 5-YE-8947-Q)
1500 CPM

"Y" Electric — Small, compact; AC counters equipped with integral rectifier for high speed and long life. Records accurately at high, low, or intermediate speeds.

"CS" Electric — Same external design and features as "Y" Series, but with larger case size and larger figures . . . for more rugged, heavy duty applications.

"YE" Electric — With electric instant reset or finger-flick instant reset.

"Y" Electric Series
4 figure
(Model 4-Y-9434-B)
600 CPM

ACTUATORS and CONTACTORS
Durant offers photo-electric, lever, roller arm, star wheel, or limit switch units for use with Electric Counters.

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DURANT MANUFACTURING CO.
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DURANT

COUNTING INSTRUMENTS

Accurately Count Everything . . . EVERYWHERE

"YE" SERIES HERMETICALLY SEALED FOR MILITARY

"H" SERIES HEAVY DUTY STROKE OR ROTARY

"D" SERIES MEDIUM DUTY STROKE OR ROTARY

"X" SERIES LIGHT DUTY STROKE OR ROTARY

LINEAL COUNTERS FOR ALL PURPOSES

"SP-MF" ELECTRIC PREDETERMINED COUNTER

REPRESENTATIVES IN ALL PRINCIPAL CITIES

FACTORY/EQUIPMENT NEWS

Begins on page 238

For more about these items, circle item numbers on Reader Service Card next to back cover.

421—First-Aid Wheel Stretcher has a removable litter that can be set on floor (resting on 2-in. legs) for easy placement of patient. Litter top, with rubber bumper around edge, has 1-in. foam pad and restraining straps. Low in cost. Balloon-type air tires. *Simmons Co.*

422—Vacuum Lifter is hand tool with 15-in. handle that removes or feeds parts to punch press without exposing operator's hands to ram. Lifts and holds securely, releasing instantly with touch on thumb lever. Vacuum cup in 1½- to 4-in. diameters. *Safety Vacuum Lifter Co.*

423—Heat Transfer Unit heats liquids without costly and bulky flame-heat-and-boiler facilities. Prewired for simple hook-up to process equipment. Compact, it controls heat from 100 to 600 F. In 10 models, from 4.5 to 80 kw., 15,350 to 272,000 Btu. *Radcor, Inc.*

424—Vibratory Feeder, for use on small bins, chutes, hoppers, or tables, produces vibrations from trickle to sledge hammer blow. Plugs into a-c or d-c outlet. Range to 8000 vibrations per minute; requires transformer or rheostat to vary frequency. *Vibro-Plus Products, Inc.*

Turn the page

EYES ARE EXPENSIVE TARGETS!

See How Western Electric Cut Eye Accident Rate 36% With Low-Cost AO Eye Protection Program

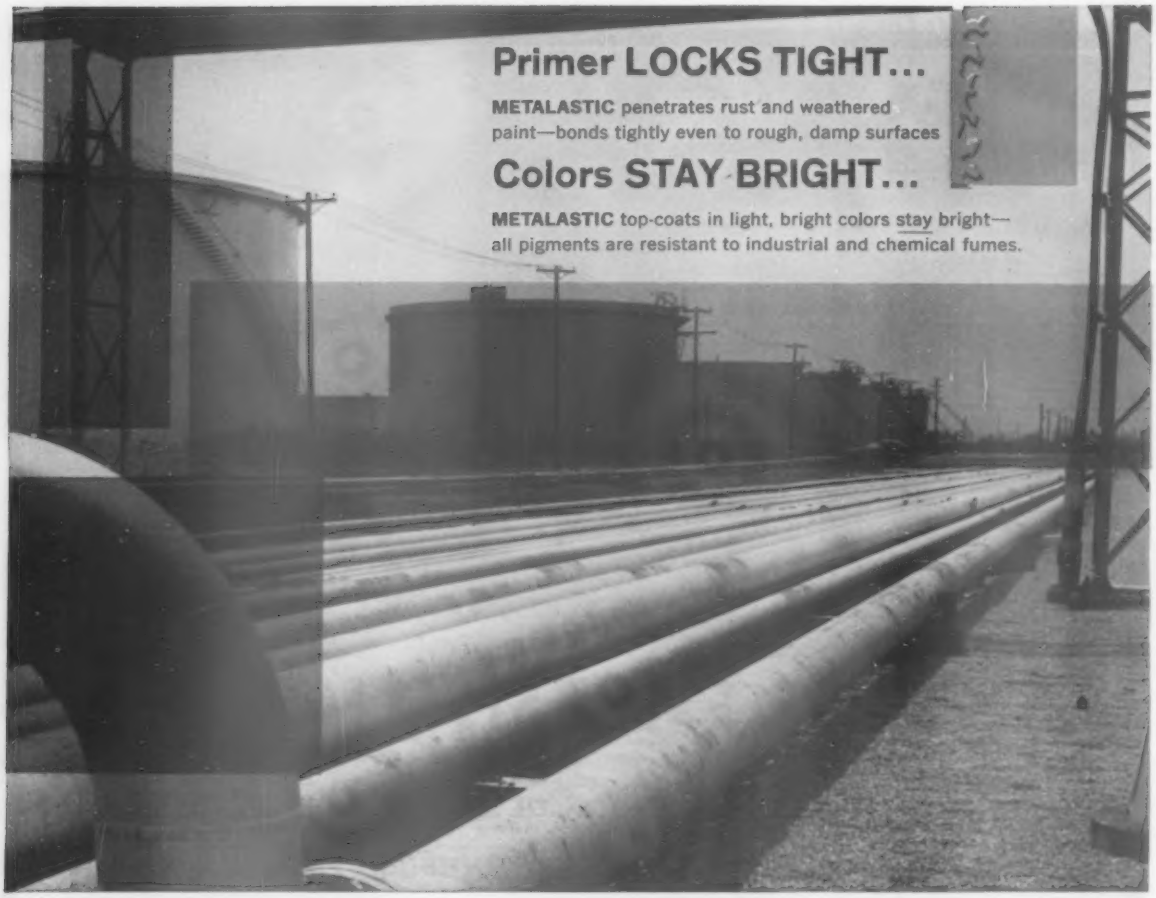
THE INSTALLATION ORGANIZATION of Western Electric Company employed 15,585 field employees in 1955 and 22,391 in 1958. Operations include erecting steel frames, mounting telephone switching equipment on the frames, cabling, connecting wire ends and thoroughly testing the finished job before turning it over to a Bell Telephone Company. Chief eye hazards are being struck by tools if wire breaks, exposed and protruding wire ends, solder splashes, flash burns and drilling.

In 1955, before a complete eye protection program was installed, the frequency rate for eye accidents was 15.9. In 1958, with all field forces equipped with safety glasses, the frequency rate dropped to 10.2. Frequency rate is the number of accidents times one million divided by the number of working hours.

Yes, industrial eye protection pays off. It saves eyes, pain, grief, skills — and dollars in compensation and medical costs. (In larger companies, dollar savings in five figures annually are not uncommon.) And when you install a program be sure you get the safety you pay for — in *safety standard frames and lenses.* Look for the Ⓐ Trademark. Write for new booklet "Eyes Are Expensive Targets".

American Optical
COMPANY
SAFETY PRODUCTS DIVISION
SOUTHBRIDGE, MASSACHUSETTS
Safety Service Centers in Principal Cities

Always insist on Ⓐ Trademarked lenses and frames


Primer LOCKS TIGHT...
METALASTIC penetrates rust and weathered paint—bonds tightly even to rough, damp surfaces
Colors STAY BRIGHT...
METALASTIC top-coats in light, bright colors stay bright—all pigments are resistant to industrial and chemical fumes.

Metal STAYS PROTECTED...with METALASTIC!®

Here's new, deep-penetrating protection against rust—a new, brighter future for buildings and equipment!

Sherwin-Williams METALASTIC Primer and Enamel now offers even longer-lasting protection . . . more adaptability to adverse surface conditions . . . lighter, brighter, cleaner colors that stay light, bright, clean!

METALASTIC Primer, with FOUR protective pigments, gives rust-inhibitive action not possible with red lead or any other single pigment. Special built-in "wetting" action penetrates and holds on rough surfaces, over tight rust, or even where surfaces are damp. METALASTIC Enamel gives new, long-lasting gloss and color retention that brings down costs per year for all hard-to-reach exposed metal areas.

METALASTIC finishes as well as Sherwin-Williams industrial quality maintenance finishes for special needs, are conveniently available through Sherwin-Williams Branches in all principal cities. Call or write The Sherwin-Williams Co., Industrial Maintenance Division, Cleveland 1, Ohio, or Montreal, Canada.

☐ Send booklet "How To Save"
☐ Send more facts on METALASTIC

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How to Save SAFELY When Painting Your Plant
This free booklet tells how . . . shows *what* to use *where*. Send for it, together with more facts on METALASTIC.

SHERWIN-WILLIAMS
MAINTENANCE FINISHES

For more facts Circle 808 on Reader Service Card

FACTORY/EQUIPMENT NEWS

Begins on page 238

For more about these items, circle item numbers on Reader Service Card next to back cover.

425—Stud Driver anchors wood or metal to concrete or steel in jiffy. Model 660 (shown) sets up to six special alloy steel fasteners in minute. Weighs under 7 lb. Automatically ejects spent cartridge. Actuated by 0.25-caliber powder charge. *Gregory Industries, Inc.*

426 — Portable Multimeter-Relay unit supervises, through built-in meter relay, any process or test where current limit (high or low) is controlling factor. Ideal for checking out control circuits. Sensitive to a-c or d-c volts, milliamperes, ohms. *Assembly Products, Inc.*

427—Plastic Spray Coating process uses Teflon or Kel-F on metal parts to eliminate abrasion, corrosion. Withstands temperatures from −350 to +450 F., and most chemicals and acids. Prevents sticking, reduces friction. Dielectric resistance to 2000 v. *Fluorocarbon Co.*

Turn the page

Radio messages to your key personnel directly and privately!

. . . with MOTOROLA transistorized Radio Pager

A problem comes up. A key executive is needed on an important matter, a maintenance man is needed to make a repair on the line—now! He's "somewhere in the building" . . . but no one knows exactly where.
With Motorola Radio Paging, you can contact him in seconds—here's how: The switchboard operator sounds a tone in his Radio Pager (and his only). He is alerted instantly. He presses the button on his Pager and hears the full voice message. Total time elapsed. . . . just seconds . . . and he's on his way to where he's needed.
Executives, engineers, supervisors, maintenance men—all get their messages on Radio Pagers that slip in the pocket or clip to the belt . . . cutting costs by increasing everyday efficiency and meeting emergencies faster.

MOTOROLA HANDIE-TALKIE Radio Pager

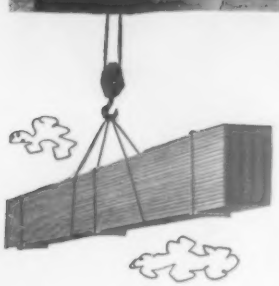
"Handie-Talkie" is the Registered Trademark of Motorola Inc.

MOTOROLA COMMUNICATIONS & ELECTRONICS, INC.
a subsidiary of Motorola Inc.
4501 Augusta Blvd., Chicago 51, Ill.

Please send me full facts on Radio Pager ☐
Have representative call for appointment ☐

NAME_____ TITLE_____
COMPANY_____
ADDRESS_____
CITY_____ ZONE____ STATE_____

For more facts Circle 809 on Reader Service Card



Cut field painting costs with Inland Bonderized Deck!

Inland's prime finish withstands rough handling

Shipping, storage, and erection can damage ordinary factory-applied prime paint. And, as you know, a finished paint job can be no better than the prime coat.

To assure a high-quality base for field painting, Inland Roof Deck is Bonderized, then flow-coated with an epoxy-resin enamel, oven-baked to abrasion-resistant hardness. The result is the most durable prime finish ever applied to steel roof deck. If field painting is required, one coat will do the job instead of two.

Write today for copy of Catalog 240.

INLAND® Steel Roof Deck

It pays . . . in many ways . . . to specify Inland Steel Building Products

INLAND WALL PANELS	INLAND CELLUFLOR	INLAND RIBFORM	INLAND ACOUSTIDECK
Catalog 243	Catalog 270	Catalog 245	Catalog 241

INLAND STEEL PRODUCTS COMPANY Member of the Steel Family

DEPT. E, 4119 WEST BURNHAM STREET • MILWAUKEE 1, WISCONSIN • ATLANTA • BALTIMORE • BUFFALO CHICAGO • CINCINNATI • CLEVELAND • DALLAS • DENVER • DETROIT • HOUSTON • KANSAS CITY • LOS ANGELES • MILWAUKEE • MINNEAPOLIS • NEW YORK • ST. LOUIS.

FACTORY/EQUIPMENT NEWS

Begins on page 238

For more about these items, circle item numbers on Reader Service Card next to back cover.

428—Air Grinder has revolving cup wheel guard to protect operator. Smooths rough spots on either flat or curved surfaces. Double handles help to maneuver and control it in all positions. Weighs 11 lb. Uses 6-in. wheel or brush, at 4500 or 6000 rpm. *Airetool Mfg. Co.*

429—Draw-Out Air Switch mounts switch and fuse element on wheels for safe, fast maintenance. Live contacts are covered by insulated barrier when assembly is out. Fuses can be tested or replaced in safety. Interrupts to 14.4 kv. *Continental Electric Equipment Co.*

430—Air-Operated Dockboard can be raised or lowered quickly by "up-down" air valve. Simple to install, 57x60-in. "Aero-Board" is powered by plant's air system. Has 10,500-lb. capacity. Special hinge prevents slipping or movement when in position. *Freightliner Corp.*

431—Fork Truck, 4000-lb. capacity, has drive control which permits steady, stepless acceleration for "inching" operations where loads must be placed delicately. Climbs 10% grade fully loaded, travels to 6.2 mph. forward or reverse. Battery-powered. *Clark Equipment Co.*

Turn to page 258

For more facts Circle 810 on Reader Service Card

For more facts Circle 811 on Reader Service Card ➤

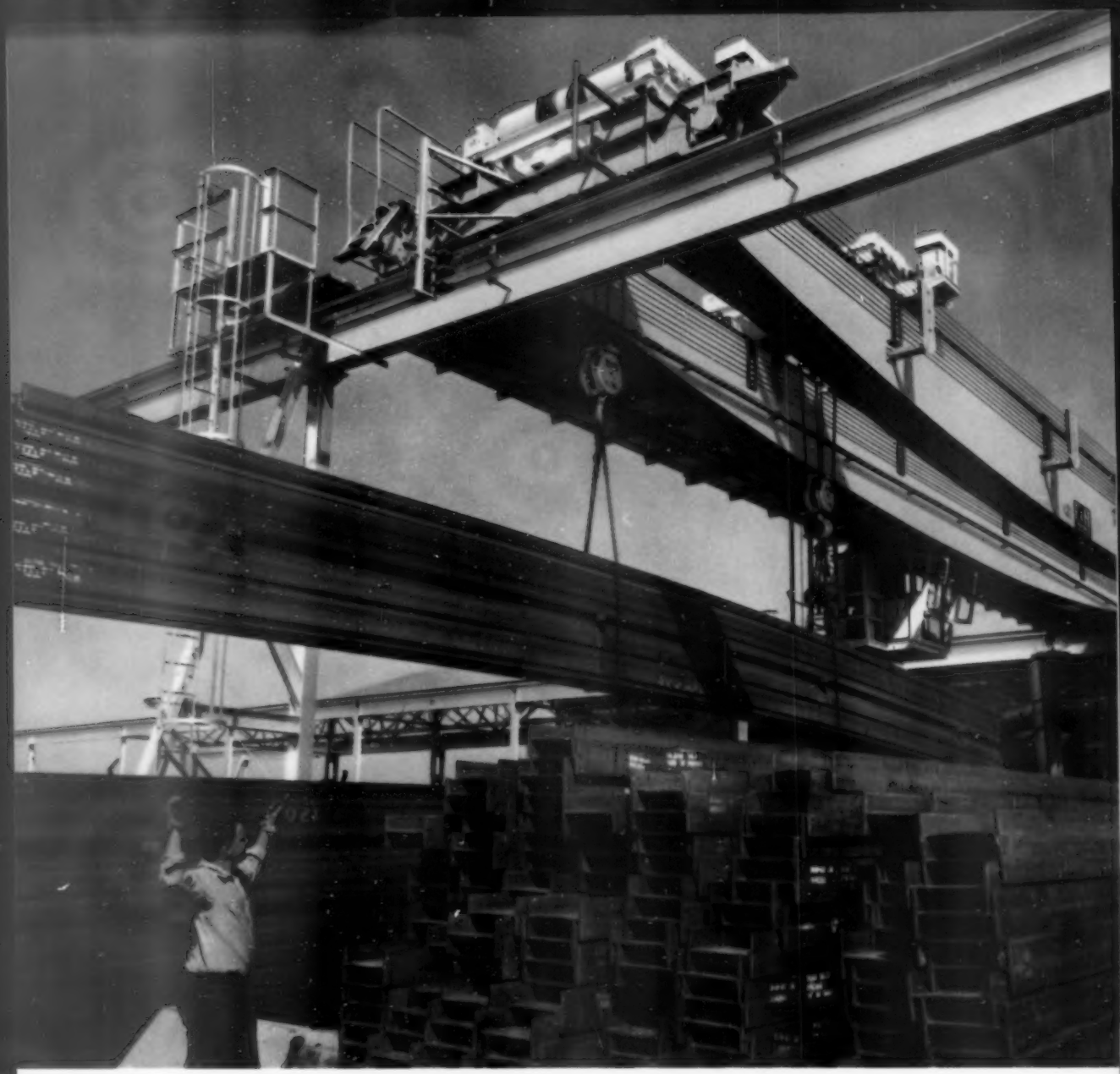


Photo courtesy Pittsburgh-Des Moines Steel Co., Fresno, Calif.

FOR EVERY APPLICATION, THERE'S ONE CRANE OUTSTANDING...

IN STEEL FABRICATING: This double-trolley crane installation is a good example of the way Harnischfeger engineers design a P&H crane for each particular job. With this arrangement, long, awkward beams can be handled quickly, safely . . . without swinging . . . and with accurate control. In addition, the use of two lighter trolleys permits higher travel speeds, thus combining load stability with fast load handling.

Regardless of the material handling problems your plant may have, chances are P&H engineers have successfully solved similar problems. Reason? No other manufacturer has installed as many overhead cranes in as many different applications as Harnischfeger.

If you'd like more information on P&H job-engineered cranes, write for bulletin C-42, Dept. 119, Harnischfeger Corp., Milwaukee 46, Wis.

Cutaway view of P&H electric load brake . . . heart of P&H Magnetorque Control . . . which consists of a simple, indestructible rotor and stationary field through which braking forces are exerted electromagnetically.

P&H
OVERHEAD CRANES

HARNISCHFEGER

Milwaukee 46, Wisconsin

HE'S AN ATLAS WITH HIS RIGHT THUMB!

Every worker is a wonder-man when it comes to lifting, loading, or transporting shapes in this West Coast steel fabricating plant. That's because a P&H Balanced Design Hevi-Lift hoist provides all the muscle . . . and fine control . . . at any time, in any weather.

Balanced Design means matched components of equal high-strength. There are *no* weak parts in this hoist! It's totally enclosed, weatherproof and dustproof for outdoor use . . . never needs greasing . . . never requires brake adjustment . . . won't heat up even under severe duty cycles.

In short, P&H Balanced Design Hevi-Lifts *will stand up longer under heavier duty cycles — with less maintenance — than any other hoist made today!*

Bulletin H55 tells the whole story. Write Dept. 223, Harnischfeger Corp., Milwaukee 46, Wisconsin.

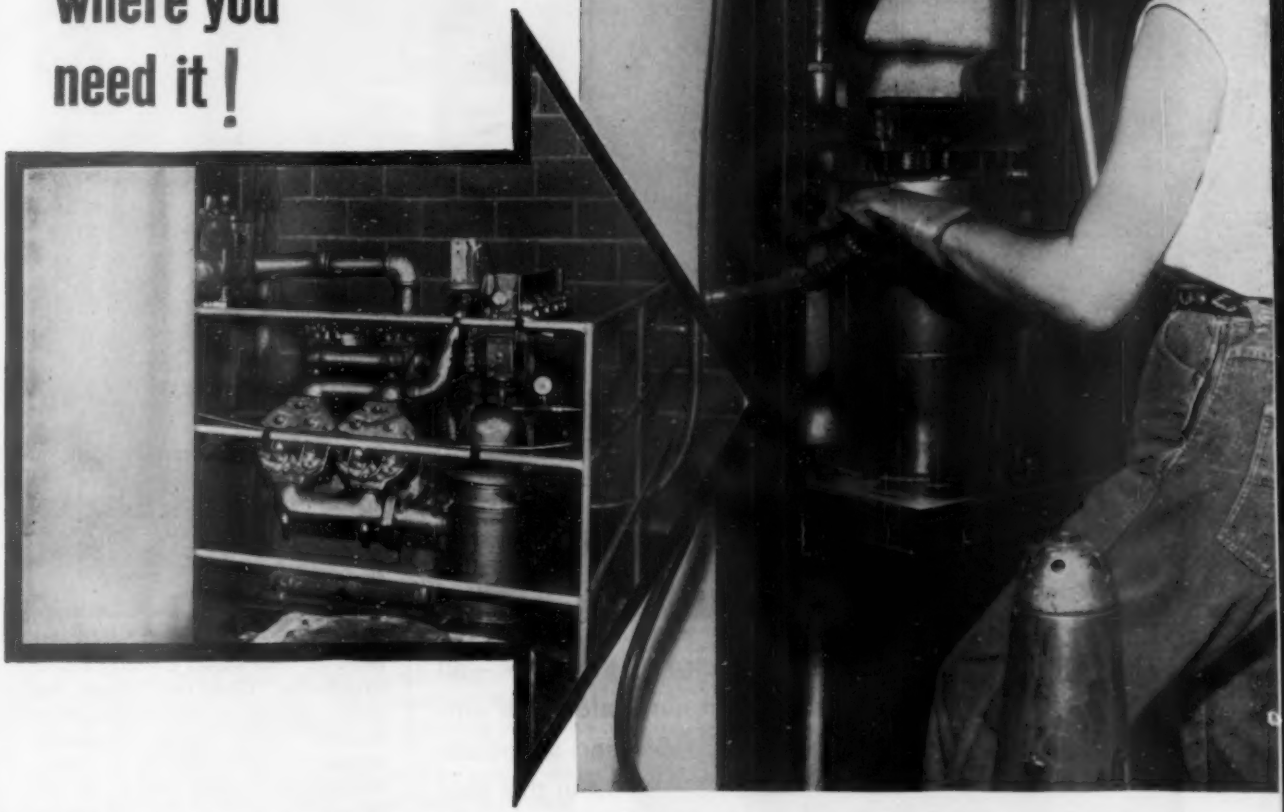
P&H
HEVI-LIFT HOISTS

HARNISCHFEGER
Milwaukee 46, Wisconsin

Photo courtesy Pittsburgh-Des Moines Steel Co., Fresno, Calif.

TEST MACHINE at a metal fabrication plant gets air from the Le Roi 100S2 shown below. Unit also supplies air for presses, automatic and manual welders, painting machines, and automatic assembly machines.

puts your plant air supply right where you need it!



LE ROI 100-HP STATIONARY COMPRESSOR

Trouble-free air-cooled LeRoi 100S2 delivers 450 cfm of air at 125 psi — yet takes up only 20 sq. ft. of floor space.

Any way you look at it, the Le Roi 100S2 two-stage stationary compressor is your best bet to lower your cost of compressed air.

It provides cool, clean airpower. And its compactness permits installation *near the point of use*, thus eliminating excess piping and costly waste of air. If you need more air, you just install more Le Roi S2 compressors — and you can still beat the cost of centralized air systems.

The electric-motor-driven 100S2 is easy to operate and maintain. Its Dual-Control permits either constant-speed or automatic start-and-stop operation. Air cooling eliminates plumbing and water line freeze-ups . . . permits indoor or outdoor installation. Balanced design reduces vibration and noise . . . extends compressor and motor life.

Put your compressed air system on a paying basis. Investigate the complete Le Roi line of unit-type and stationary air compressors — from ½ to 100 hp. Contact your Le Roi distributor, or write to Le Roi Division, Westinghouse Air Brake Co., Milwaukee 1, Wisconsin. sc-05

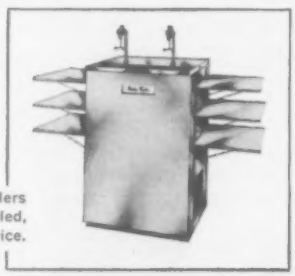
LE ROI STATIONARY COMPRESSORS

PORTABLE AND TRACTAIR® AIR COMPRESSORS • STATIONARY AIR COMPRESSORS • AIR TOOLS

For more fatcs Circle 812 on Reader Serice Card

NOONTIME, U.S.A. The clock strikes twelve—all America steps out to lunch. In company cafeterias employees have a welcome chance to relax and associate with other fellow members. Halsey Taylor is in this picture—has been for years—with modern cafeteria coolers that speed service and provide health-safe drinking water. Plant and management know that whether it's a cooler or a fountain, if it's Taylor-made it's always dependable! *The Halsey W. Taylor Co., Warren, Ohio.*

Halsey Taylor®



● They're many different kinds of cafeteria coolers in the Halsey Taylor line . . . some water-cooled, others air-cooled, all designed for lifetime service.

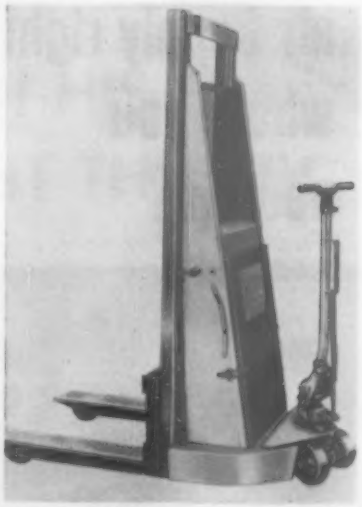
260

ASK FOR LATEST CATALOG, SEE SWEET'S OR THE YELLOW PAGES

FACTORY/EQUIPMENT NEWS

Begins on page 238

For more about these items, circle item numbers on Reader Service Card next to back cover.



432—Mobile Elevator offers fifth-wheel steering as optional feature for greater maneuverability. Battery-powered "Hy-Boy" rolls more easily and can be more accurately guided than with casters. Convenient handle gives positive steering control. *West Bend Equipment Corp.*

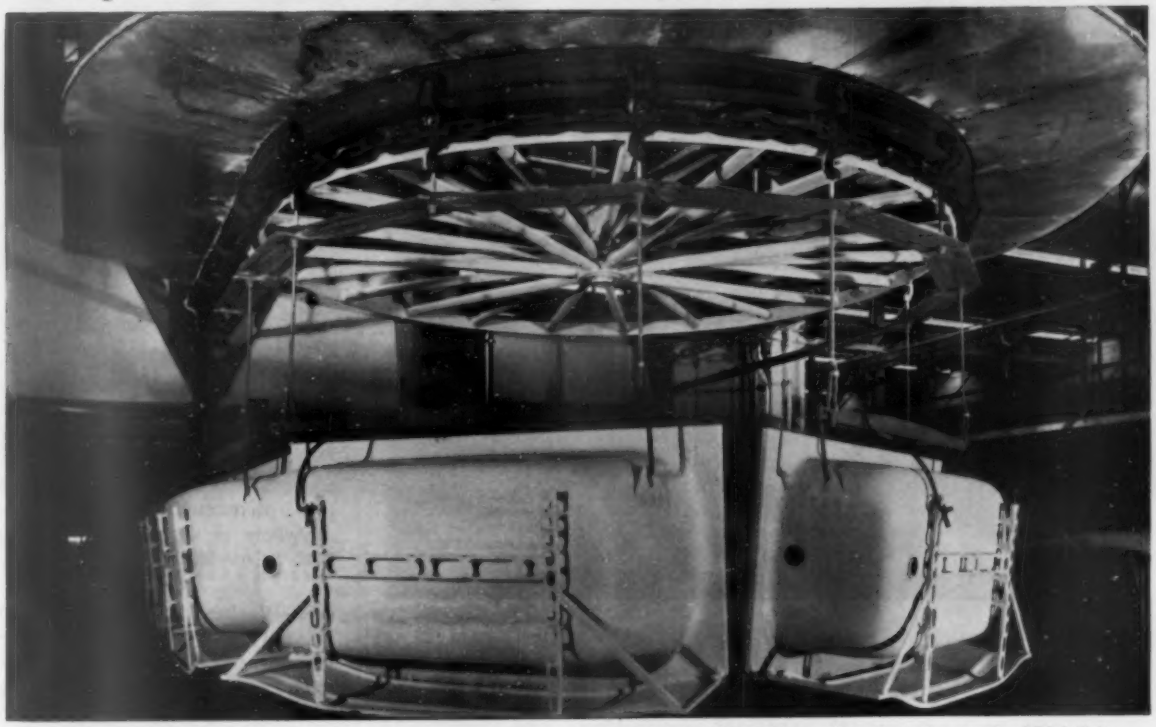
433—Synthetic Belt has "molecular memory" that makes it nearly 100% stretch-free. Gives under loads, but always returns to original length or tension. "Revo" belt can be run indefinitely without take-up or idlers. Withstands heat to 200 F. *L. H. Shingle Co.*

434—A-C Speed Drive is adjustable before or while operating. Built-in tachometer monitors and corrects speed. Little maintenance — no brushes, commutators, or slip rings. Two models: ranges to 100 hp. 1700 rpm., or 7½ hp. 3400 rpm. *Westinghouse Electric Corp.*

Turn the page

LINK-BELT trolley conveyors

run parts continuously through processing systems



PLUMBING FIXTURES ride a mile-and-a-half network of Link-Belt trolley conveyors at Briggs Manufacturing Co., Warren, Mich. The Ferro Corporation of Cleveland furnished enameling facilities —chose Link-Belt trolley conveyors for spray booths, drying ovens, blowoff booths, furnaces. Above, bathtubs make 180° turn to enter furnace. Furnace seal plates protect the conveyor.

Above work areas or through otherwise unusable plant areas, Link-Belt trolley conveyors transport parts or products through all processing steps in a continuous flow.

Regardless of the distance to be traveled or the various levels involved, these versatile systems move products of any size between rooms, floors and buildings. Link-Belt has successfully engineered systems for handling everything from eggs to auto frames. Expert analysis of your system can bring you the best in layout planning and flow efficiency.

For expert consultation, call your nearest Link-Belt office today, or write for Trolley Conveyor Book 2330.

METAL FOLDING CHAIRS travel on a Link-Belt trolley conveyor system through cleaning, bonderizing, painting and baking operations at American Seating Co., Grand Rapids. System was developed by De Vilbiss Metal Fabricators. (prime contractors for finishing operations) and production engineers of American Seating Co.

MADE IN A BEARING PLANT BY BEARING SPECIALISTS! Precision-made Link-Belt ball bearing trolleys are designed to maintain continuous rolling contact in all positions . . . create minimum power demand. Hardened, concentrically ground raceways, accurately cage-spaced balls, frictionless labyrinth seals —all assure smooth trolley operation.

LINK-BELT

TROLLEY CONVEYORS

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1, To Serve Industry There Are Link-Belt Plants and Sales Offices in All Principal Cities. Export Office, New York 7; Australia, Marrickville (Sydney); Brazil, Sao Paulo; Canada, Scarboro (Toronto 13); South Africa, Springs. Representatives Throughout the World. 19,285

CORPORATE CHARACTER

Founded on Understanding

Armed with a thorough understanding of your painting problems, Wilbur & Williams has formulated a line of Specialized Protective Coatings the proven performance and reliability of which instill confidence wherever they are used. Formulated specifically to solve any painting problems you may encounter in plant, building, or equipment maintenance, Wilbur & Williams "protectioneered" finishes are fast-drying, easy to apply, durable and economical.

SUPER DAMPCOAT — To paint damp walls and ceilings for complete resistance to dampness & fungus — odorless — chemical resistant — non-yellowing.

Another MINIMUM — INTERRUPTION MAINTENANCE Product from . . .

THE WILBUR & WILLIAMS CO., INC.

Factory and General Offices, 651 Pleasant St., Norwood, Mass.

In Canada, WILBUR & WILLIAMS, 7920 16th Ave., Ville St. Michel, Montreal 38, P. Q.

For more about these items, circle item numbers on Reader Service Card next to back cover.

435—Monorail Conveyor can be set up to travel automatically to any one of eight stations, stop for loading, then re-set to return to home station. Propelled electrically at 90 fpm., or manually. Can be stopped anywhere in system by obstructing path. *American MonoRail Co.*

436—Pocket Receiver, weighing about 10 oz., is fully transistorized. Provides ½-watt audio output—loud enough for voice communication in noisy areas. Available for operation in 25-54 or 144-174 mc. frequencies. Powered by battery or mercury cells. *Motorola, Inc.*

437—Heater Bank, for air-conditioning ducts, provides 3510 sq. in. of heat-exchange surface per 10 kw. in 2535 cu. in. space. Heats air fast with little obstruction to flow. Tandem-mounted heaters come in lengths and widths for any size duct. *Electric Heater Specialty Co.*

Turn the page

"Timely deliveries from U.S. Steel Supply help keep us on schedule," *says Mr. Tom Meyer,*

Vice-President and General Manager, Meyer Products, Inc., Cleveland, Ohio
Manufacturers of quality snow plows and angle-dozers for jeeps, trucks, tractors, etc.

"Whenever we're faced with a production bottleneck because we're running out of COR-TEN steel or other material," says Mr. Meyer—"we pick up the phone and call U. S. Steel Supply. In a matter of hours, and sometimes minutes, the material is on its way to our plant.

"Time after time, U. S. Steel Supply has helped keep our production line on schedule with overnight service of urgently needed materials. U. S. Steel Supply has also shown us how to free more plant space for production facilities. Instead of carrying a huge in-plant inventory, we order only the material we need . . . when we need it."

If material shortages are causing you to fall behind your production timetable, call your nearest U. S. Steel Supply Steel Service Center. You'll find us in the Yellow Pages listed under *Steel*.

USS is a registered trademark

U. S. Steel Supply
Division of
United States Steel

USS

Steel Service Centers and Complete Steel Strapping Service at:
Baltimore, Birmingham, Boston, Chicago, Moline, Cleveland, Houston, Dallas, Los Angeles, Memphis, Milwaukee, Newark, Southington (Conn.), Philadelphia, Seattle, Portland (Ore.), Pittsburgh, St. Louis, St. Paul, San Francisco.
General Offices: 208 South LaSalle Street, Chicago 4, Ill.

For more facts Circle 816 on Reader Service Card

PAYLOADER® handling system

easily adjusts to plant changes

IN SYRACUSE, N.Y., on the same site where they built America's first soda ash works about 80 years ago, Solvay Process Division, Allied Chemical Corporation today operates one of the world's most modern alkali manufacturing installations. This progressive firm maintains an active modernization and plant expansion program . . . relies on the flexibility of "PAYLOADER" tractor-shovels to handle the required volume of raw materials without interruption.

SEVERAL SIZES of "PAYLOADER" units are used in various Solvay plants today: a 5,000-lb. operating capacity model is used by the firm's construction division; 3,000-lb. capacity Model HAH's with extra long reach convey sodium chloride from stockpiles to elevator hoppers; and, speedy new 2,500-lb. operating capacity H-25's (shown) are used to transport in-process material to floor chutes.

THESE "PAYLOADER" UNITS provide the most flexible bulk material handling system that can be installed in any plant. Without special or expensive installation of fixtures, they load themselves anywhere . . . travel any path (around corners, through narrow aisles and doorways, up and down ramps) with speed and safety . . . deliver and unload themselves any place . . . all with a one-man operator in the driver's seat.

A HOUGH DISTRIBUTOR near you will be glad to demonstrate how a "PAYLOADER" system can solve your bulk handling problems by reducing costs, increasing output. Return the coupon today for more facts.

PROVEN 'PAYLOADER' MODELS — available in 20 models (2,000 to 12,000-lb. operating capacity) for every material handling need, indoors or out . . . and backed by the finest Distributor organization in the tractor-shovel industry.

HOUGH®

THE FRANK G. HOUGH CO.
LIBERTYVILLE, ILLINOIS
SUBSIDIARY — INTERNATIONAL HARVESTER COMPANY

THE FRANK G. HOUGH CO.
755 Sunnyside Avenue,
Libertyville, Ill.

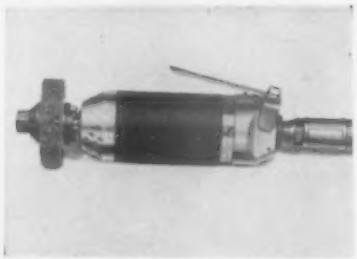
Send Bulletin No. 424 describing the complete "PAYLOADER" line of tractor-shovels: 5-A-2

Name
Title
Company
Street
City State

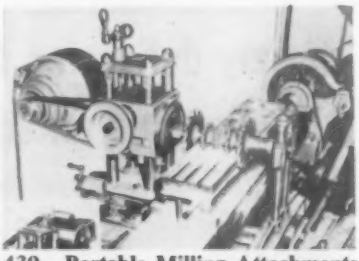
FACTORY/EQUIPMENT NEWS

Begins on page 238

For more about these items, circle item numbers on Reader Service Card next to back cover.



438—Air Grinder, in choice of 10 operating speeds from 16,000 to 25,000 rpm., drives rotary files, carbide burrs, sanding and cutting disks, and small grinding wheels. Compact, it comes in spindle and collet chuck models, choice of three controls. *Thomas C. Wilson, Inc.*



439—Portable Milling Attachments fit easily on 10- to 18-in. lathes to work cumbersome or odd-shaped parts. Available in three types: Model 1 has metal removal rate of ⅓ cu. in. per min. (in mild steel); Model 2, ¾ cu. in.; Model 3 (photo), 1½ cu. in. *Dumore Co.*

440—Leakproof Centrifugal Pump handles volatile, toxic, flammable and other hazardous clean liquids. Integrated motor and pump eliminates mechanical seal, stuffing box, or gland. Comes with 1- or 1¼-in. discharge, capacities to 110 gpm., heads to 100 ft. *Gould Pumps, Inc.*

Turn the page

For more facts Circle 817 on Reader Service Card

Hydraulic presses should work smoothly, with no jerk or erratic action. But sludge and varnish in an Eastern plant's presses caused uneven operation, with increasing "rejects."

A Sinclair lubrication engineer recommended Sinclair's new DURO hydraulic oils with oxidation, rust and foam inhibitors.

Result: outstanding performance, with "rejects" cut to minimum.

Let Sinclair tackle (and solve) your plant problems. Call your local representative or write...

Sinclair

SINCLAIR REFINING COMPANY

TECHNICAL SERVICE DIVISION • 600 FIFTH AVE., NEW YORK 20, N.Y.

free layout service

...assures better storage facilities for less money

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Find out how to store more stock in less space . . . what units to buy . . . how to make maximum use of each unit to reduce equipment investment . . . how to arrange units for fastest stock handling . . . proper width of aisles, location of packing benches, and other valuable data by using Equipto's FREE LAYOUT SERVICE. Profit by the aggregate experience of trained Equipto engineers who have designed thousands of layouts of every description.

For simpler layouts, or for those who wish to design their own facilities, Equipto offers a fact-crammed free booklet entitled, "How to Solve Your Storage Problems".

Remember, Equipto Shelving offers 60% faster assembly, instant shelf adjustment, easy rearrangement of components, removal of units intact. Available in four distinct types to suit every design preference or price requirement. Write today for free booklet.

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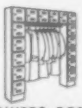
BENCHES

DRAWER UNITS

LOCKERS



EQUIPTO ROBE

STOCK CARTS

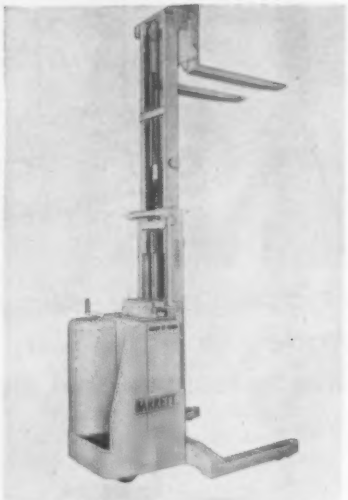
EQUIPTO ANGLE

Equipto

FACTORY/EQUIPMENT NEWS

Begins on page 238

For more about these items, circle item numbers on Reader Service Card next to back cover.



441—Hi-Lift Truck stacks pallet loads from 1000 to 4000 lb. in narrow aisles. Operator on platform controls maneuvering with left hand. Right hand works single lever for forward or reverse, fork lifting or lowering. Dead-man brake; 24-v. system. *Barrett-Cravens Co.*

442—Compressed Air Dryers, capacities of 10,000-, 11,000-, and 11,500-cfm., at 100 psi., come in 33 sizes to fit from small to large operations. Automatically trap residual water vapor and corrosive by-products to prolong life and equipment accuracy. *Van Products Co.*

443—Low-Speed Fans, in sizes from 65 to 94 in., move high volume of air, permitting use of single fan instead of several small units. The 25-hp., 94-in. model moves 174,000 cfm. of free air or 157,000 cfm. against ¼-in. static pressure. *Hartzell Propeller Fan Co.*

Turn the page

NORTH PIER TERMINAL—CHICAGO

one of the most modern and strategically located freight centers in the world is

ADT PROTECTED

This terminal is a shipper's dream with more than a quarter of a million square feet in ship-side storage. President W. W. Huggett employs ADT fire and burglary protection services, here and in their several other locations, and says that it presently

saves $23,000 a year

Adequate protection depends not only upon the quality and installation of the alarm devices but also upon the constant inspection and maintenance provided year after year. The real economy—and loss immunity offered by ADT—are two good reasons why it protects properties valued at 56 billion dollars.

Controlled Companies of

AMERICAN DISTRICT TELEGRAPH COMPANY

A NATIONWIDE ORGANIZATION

Executive Office: 155 Sixth Avenue, New York 13, N. Y.

B-416

Strong, Positive Sealing and Holding

Shuford's SHURTAPE® RP-25

MEETS FEDERAL SPECIFICATION PPP-T-76*
*Tape, Pressure-Sensitive, Adhesive, Paper, Water-Resistant

Heavy Duty Carton Sealing Tape

This tough tape seals and reinforces V-board and W-board fiber containers, preventing the entry of foreign matter and retaining or excluding moisture. It also protects individual parts, and can be used for stenciling, masking or holding protective wraps on furniture in transit.

With its excellent resistance to water and abrasion, paper backed SHURTAPE RP-25 provides a low-cost, heavy-duty tape that works well in many different phases of industrial packaging.

Meets specifications for motor freight, rail, railway express, air express and postal shipments.

Write for free sample roll and complete information to

CLOTHES LINES • TWINES
PRESSURE-SENSITIVE PAPER TAPES
SASH CORDS • WEATHER STRIPPING
COTTON & RAYON YARNS • EXTRUDED PLASTICS

Shuford Mills, INC SINCE 1880 HICKORY, N. C.

World's Largest Manufacturer of Cotton Cordage

4758

FACTORY/EQUIPMENT NEWS

Begins on page 238

For more about these items, circle item numbers on Reader Service Card next to back cover.

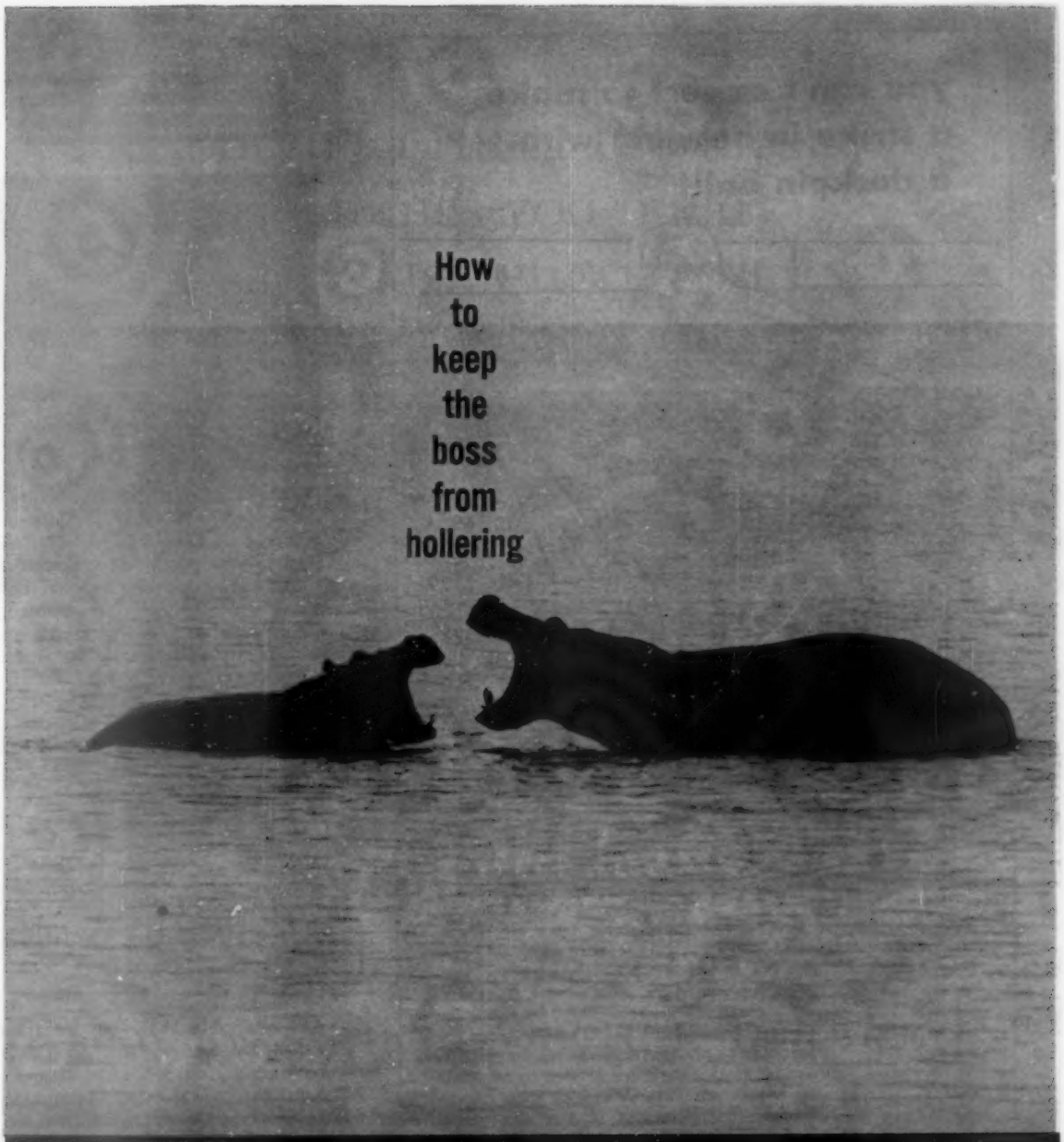
444—Portable Dustfree Cabinet electrostatically traps 95% of particles from 0.08 to 80 microns. Uses double filtration—dustfree air enters work chamber, ejects dust particles at outlet. Ideal for assembly, testing, research of precision parts. *Specialties, Inc.*

445—Lighting Fixture has aluminum die cast body and guard to permit relamping and cleaning without aid of tools. White enameled reflectors are ventilated, have self-lock nylon shoes for attaching by 45-deg. turn. In 100- or 200-watt types. *Steber Mfg. Co.*

446—Portable Electric Timer connects to machine to automatically record time and date from two sides of unit. Left side prints running time, right side date of record. For use in checking downtime or as guide in preventive maintenance. *Cincinnati Time Recorder Co.*

447—Concrete Vibrator, heavy-duty, causes mixture to flow like liquid at 9000 vibrations per min., full load (at 90 psi.). Provides fast fill-up of forms to 30 in. with concrete of at least 2½-in. slump. Slim head fits easily between reinforcing bars. *Ingersoll-Rand Co.*

Turn the page



...about metal and masonry corrosion.

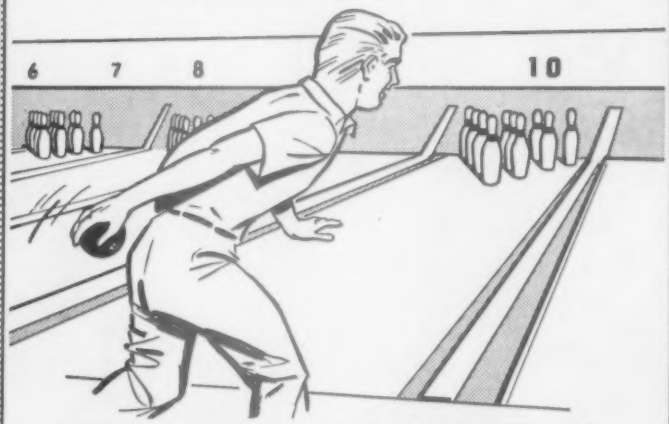
Start by using Allied Chemical 34Yc Cold Coating #134 and Cold Tar Paint #110. Both items offer high-quality, low-cost protection against metal and masonry corrosion. 34Yc is excellent for all surfaces exposed to highly corrosive conditions, extreme moisture, or acid and alkali fumes. It's also an ideal coating for tanks, pilings, structural steel, underground pipes and units. Coal Tar #110 is preferred for outdoor frames and posts, safety and sprinkler piping, transmission towers, general railroad work.

If your industrial distributor is not currently stocking these products, write to Industrial Tar Products Dept.

PLASTICS AND COAL CHEMICALS DIVISION
40 Rector Street, New York 6, N. Y.

Allied Chemical

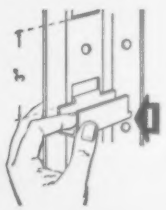
you can't expect to make a strike in bowling with a duckpin ball!



you can't expect to have the best shelving unless it's

BORROUGHS STEEL SHELVING

Test and compare Borroughs steel shelving from any angle, and you'll quickly find out why it's the best shelving value your money can buy. It's an established fact that Borroughs steel shelving is the most simple, most flexible, most rapidly assembled shelving on the market. What's more, shelves can be installed or rearranged without nuts or bolts . . . no special tools are needed to assemble an entire unit . . . any unit or shelf can be moved independently. If you want more proof of Borroughs superiority . . .



send for catalog

Insert 4 shelf support brackets . . . no fumbling with studs, bolts, nuts or lock washers. **and then** **Tilt shelf into support brackets** . . . and shelf is ready for loading.

BORROUGHS MANUFACTURING COMPANY
OF KALAMAZOO
A SUBSIDIARY OF THE AMERICAN METAL PRODUCTS COMPANY OF DETROIT
3020 NORTH BURDICK ST. amp KALAMAZOO, MICHIGAN

FACTORY/EQUIPMENT NEWS

Begins on page 238

For more about these items, circle item numbers on Reader Service Card next to back cover.

448—Hydraulic Press, for jobs requiring pressures of 25 and 40 tons, is simple to operate, yet powerful. Electrically operated, compact unit requires low capital investment. Completely enclosed hydraulic system prevents fluid contamination. *American Chain & Cable Co.*

449—Portable Watt-Var Recorder is fast, low-cost way to check power consumption efficiency and to obtain data for power-factor correction. Inkless mechanism taps out two records. Split-core transformer hooks on line—reads without interrupting current. *General Electric Co.*

450—Solids/Liquids Pump, positive displacement type, processes viscous liquids and liquids with abrasives in suspension. Pulseless, non-foaming action. In three sizes, from 72 to 13,800 gph. Handles latex, paper, stock, paint, clay, slip, shampoo. *Goodyear Pumps, Inc.*

(This item is being re-run from February FACTORY, *page 128, to correct pump capacity from gpm. to gph.).*

See why Pittsburgh Corning Products make the things you build look better, last longer, cost less

example: FOAMGLAS® Roof Insulation for a dry roof that keeps heat where it belongs

Only when a roof insulation is completely impervious to moisture, can it keep heat where it belongs —inside in winter, outside in summer. Most insulations soak up water and vapor like a sponge. Their efficiency sags. FOAMGLAS Roof Insulation, on the other hand, absorbs no moisture. Because of its sealed glass cells it stays dry—even when a roof leak develops. *Insulating value stays constant.*

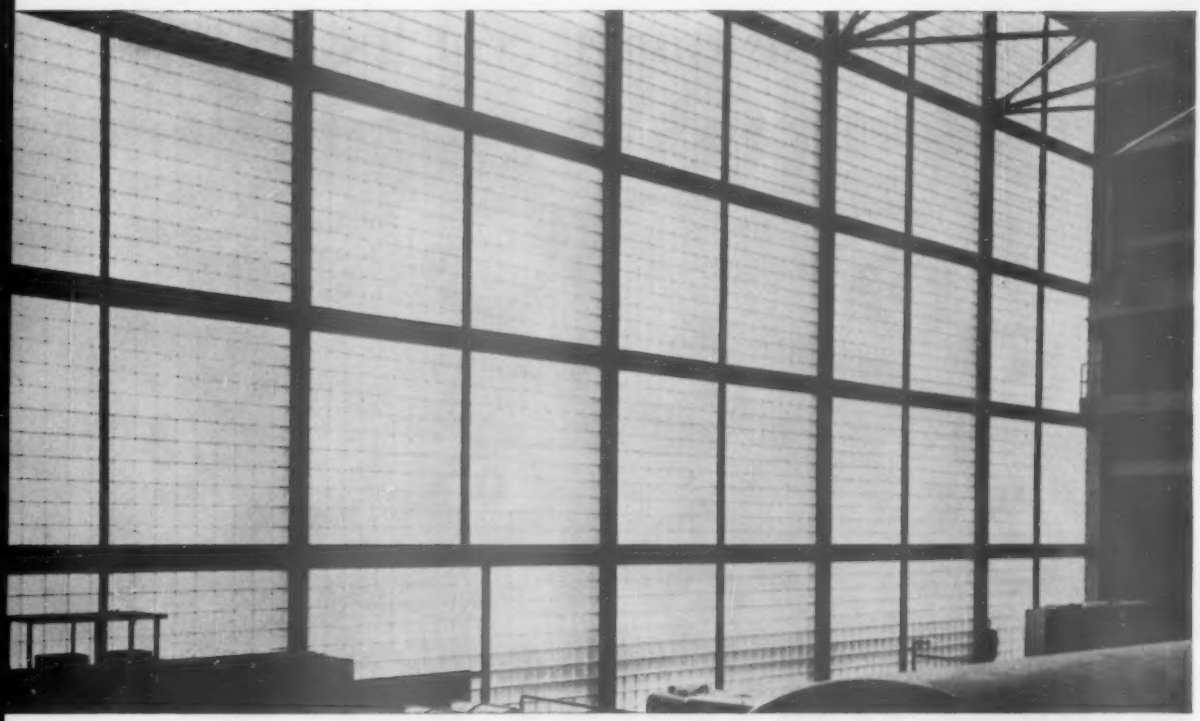
And remember this: FOAMGLAS will never melt or warp with the application of hot bitumens or in strong sunlight. Joints stay true and tight. Furthermore, its high compressive strength makes FOAMGLAS a strong, firm base for built-up roofing. For these and a host of other reasons, it pays to standardize on FOAMGLAS Roof Insulation.

Take advantage of the coupon on page 3 of this advertisement.

PITTSBURGH CORNING

For more facts Circle 824 on Reader Service Card

example: 11,000 PC Glass Blocks let light in, keep glare out, cut costs at Cromby Station



Back in the early forties, Philadelphia Electric Company first used PC Glass Blocks for major wall areas in one of their electric generating stations. Glass block walls have proved fully effective in providing controlled, glare-free, natural light within this plant. At the same time, they have completely eliminated sash repair and replacement, painting, window washing and breakage. Savings in maintenance costs have been substantial.

Latest of this company's glass block installations is at Cromby Station where 11,000 PC Glass Blocks on two walls provide nearly a quarter-acre of effective daylight control. Maintenance costs have been and should continue to be nil.

The examples are many, the moral clear: a PC Glass Block wall is a proven means of insuring proper daylighting at low cost with an end to window maintenance headaches.

Take advantage of the coupon on the next page of this advertisement.

PITTSBURGH PC CORNING

For more facts Circle 825 on Reader Service Card

example: FOAMGLAS® STAY-DRY Pipe Insulation cuts maintenance headaches at Norton Building

Years of trouble-free service in difficult operations have proved the moisture resistance of FOAMGLAS pipe insulation a sure guarantee of constant insulating value. Now Pittsburgh Corning wraps that guarantee in a factory-applied Kraft-foil laminate jacket and creates a low cost way to apply constant insulating protection to building service lines. The name of the product is FOAMGLAS STAY-DRY Pipe Insulation . . . for lines from +35 °F to +350 °F.

Consulting Engineers, Bouillon, Griffith and Christofferson used it to protect some 18,000 ft. of heating-cooling lines in Seattle's new Norton Building. They found: easy application; no extra vapor seals or moisture cut-offs required; high compressive strength prevents sagging; condensation on the lines eliminated.

Try this unique new pipe insulation yourself. It comes in 24″ lengths, in 1″ and 1½″ thicknesses for all lines from ½″ tubing through 12″ IPS. Detailed specifications on request.

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Dept. FF-50, One Gateway Center, Pittsburgh 22, Pa.

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- ☐ FOAMGLAS Low Temperature Insulation
- ☐ FOAMGLAS Insulation for Industrial Piping
- ☐ FOAMGLAS STAY-DRY Pipe Insulation
- ☐ FOAMGLAS Insulation for Curtain Wall Panels
- ☐ PC GLASS BLOCKS
- ☐ The PC 4 x 12 Block
- ☐ PC Color Glass Blocks
- ☐ FOAMSIL, the Acid-proof Insulating Refractory

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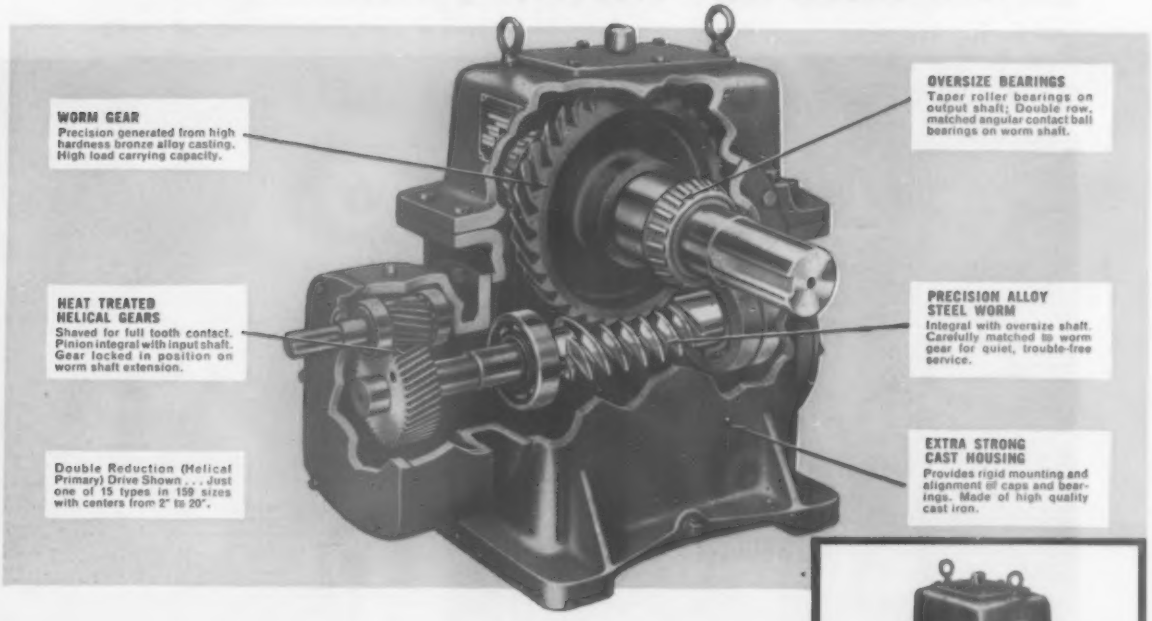
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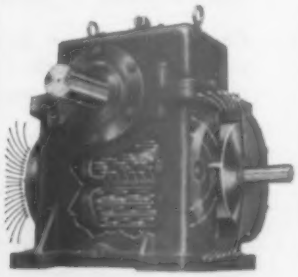

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FACTORY

PLANT OPERATIONS CASE BOOK

TRAINING WITH TAPE AND FILM

On the job assembly line training is almost entirely automated at Bendix Aviation. Worker presses a pedal, and a slide projector shows a pictorial story of the operation. At the same time a synchronized tape recorder gives easy-to-understand verbal instructions . . . page 281.

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NORMAN H. SOLON, EDITOR

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LADDERS ARE SAFETY THREAT.

POLE GUN DOES JOB EASILY.

Paint Guns Really Take a Stretch

Airless pole spray guns make short work of preventive maintenance painting at Rocketdyne Division of North American Aviation, Inc. The guns have eliminated the need for special scaffolding to get at the high and inaccessible areas of the plant —those 8 or more feet off the ground.

Use of scaffolding usually requires extra space and at least two capable men. It also involves planking, extension boards, and non-productive set-up time. And it's a potential accident hazard. With pole guns, on the other hand, the painter can stand next to the pressure pot. This reduces the many feet of air and fuel lines needed with scaffolding.

The use of pole guns of varying sizes (i.e., 4, 8, 10, 12, 14, and 16 feet) takes care of most painting problems at North American. These guns (Binks Manufacturing Company, Los Angeles) are equipped with two types of heads for different jobs. The standard head is used for normal flat work; the swivel head permits spraying at any angle with complete control. The latter is used for painting beamed ceilings, structural steel, sheet metal duct work, and bridges.

Operating the gun is a cinch. The operator merely exerts a slight pressure at one end with the palm of his hand to activate the spray nozzle at the other end.

The hot spray paint applications have eliminated blushing of paint materials in damp, wet, or cold weather at the plant. Company officials also find that the airless spray equipment has cut out masking and need for dropcloths. And it is helping good housekeeping by reducing the amount of clean up caused by over-spray.

Source: Harry Monroe, General Foreman of Maintenance, Rocketdyne Division of North American Aviation, Inc., Canoga Park, Calif.

Executive Suites for Craftsmen

Having trouble recruiting and holding skilled craftsmen at your plant? Magnetic Metals Company, Camden, N. J., is accomplishing this by providing individual offices for each surface grinder. This has two bene-

fits: better morale and increased production.

The company also gives its grinders the final say regarding design and structure of these "executive quarters." When the men first had private offices, they missed the sounds and personal contact of the conventional toolroom. They felt lonely. This problem was solved by installing large double-pane picture windows in the offices. So although the rooms are still soundproof, each worker now has visual contact with his neighbors.

Soundproofing has not only eliminated distraction, but also allows each grinder to better hear the noise of his grinding wheel in operation. Work of close tolerances is aided by a luminous ceiling of high-output fluorescent lighting, which is uniform and shadow-free.

Each office is equipped with individual air-conditioning and every craftsman has his nameplate on the sliding door.

Workers now do a better job, have greater pride in their craft.

WELDS IN ANY POSITION WITH THIS MACHINE

Fusion welding can be done anywhere—even upside down inside a 20-in. pipe—at North American Aviation, Inc., Los Angeles. It's done with an automatic tungsten inert gas automatic welder (Sciaky Brothers, Inc., Chicago) equipped with a 12-ft. boom. The machine has a 360-deg. rotating miniaturized welding head and static control. And it can follow crooked and bumpy welding seams up to 4 inches off course. The operator has a close-up view of the weld at all times via a TV camera at the head and a monitoring screen at his control panel.

Training by TV

Closed circuit TV gives realistic interview training at Babcock & Wilcox Company, New York. Trainees watch actual interviews taking place. But the people being interviewed are not disturbed by an audience.

The interview, conducted in the privacy of one room, is picked up by a TV camera and piped to a screen in another area. There the trainees and an instructor watch a live demonstration of correct and incorrect interviewing techniques. Afterwards they engage in a give-and-take discussion on what they saw.

Storage Rack Saves Space and Time

This method of storing angle steel has cut space requirements 30% at Rolled Steel Corporation, Skokie, Ill. And it's much safer.

The company used to store angle irons on the warehouse floor. Otherwise, stacked loads might sway and fall. Even on the floor they became a hazard if piled to any height. And damage to the ends and edges of the iron was common. Also, it took manual labor to prepare and load the stock for shipment.

Now the stock is tied with steel cables to form slings. This way an overhead crane can be used for hauling. The system involves a series of welded I-beams rising vertically from the floor with short steel crossbars for supports. Each I-beam holds 50 tons of iron.

SHIPPER CALLS IN LOAD DATA . . .

OPERATOR PUNCHES IT ON CARDS.

Mike Sidesteps Paperwork

How would you like to have the entire shipping manifest of a truck on punched cards as fast as it's loaded? And with no paperwork at the dock? Yale Transport Company, New York City, does this, and the procedure could readily be adapted for industrial shipping.

The trick is fast communications between departments. The system works like this:

Every package coming into the freight consolidating area is coded by serial number, source, and weight. The job is made easy by the use of perforated glued tape preprinted with the source's code letters. Each perforated section also carries a serial number. All the receiving clerk has to do is mark weight and destination code on the tape and keep track of the serial numbers. Thus, by simple subtraction, he can give the incoming trucker a bulk receipt for the number of pieces delivered.

At the end of the day consolidated shipments are loaded. Here's where fast communications pay off. As any one of the 18 "callers" starts a load, he plugs in his headset-microphone combination. This connects him to an automatic switchboard (Tele-Norm Company, New York). This switchboard, in turn, connects him to the line feeding the next open key punch operator (there are 11) in another part of the warehouse. If no line is available, a busy signal is given. As each package is loaded, code number and weight are called out and the operator punches it on the card. Cards are used for making up shipping manifests, billing, *pro rata* consolidating service charges. They are then filed away.

Wooden Frames Save Jugs' Necks

Glass carboys are in no danger of losing their necks at Oakite Products, Inc., Milltown, N. J. They're well protected with a frame constructed of 1x4-in. planks secured by wire strappings.

This permits the carboys to be stacked in tiers without fear of breakage—a big space-saver. Before the frames were used carboys could be handled and stacked in units of fours, but did not lend themselves to upright palletizing.

Scaffold Floats on a Water Base

Water is proving an efficient and inexpensive scaffolding base at Dow Chemical Company's Midland, Mich., plant. Scaffolding was needed for extensive maintenance on the inside of a cone bottom and cone top cylindrical storage tank some 16 feet in diameter, 30 feet in height.

To build a conventional scaffold base on the conical bottom would be too costly, the company decided. It would mean lowering all material through a 24-in. manhole.

So this floating scaffold, made of polystyrene foam plastic boards decked with 2x12-in. planking, was built inside the tank. The tank was then filled with water. The level is raised or lowered to bring the work platform to the proper working level. Then wedges are driven between the platform and the sides of the tank to prevent tipping.

High Foot-Candles With No Glare

Draftsmen at National Cash Register Company, Dayton, Ohio, work in 160-foot-candle illumination—minus glare. This contrasts sharply with 40 foot-candles under the old incandescent lighting system.

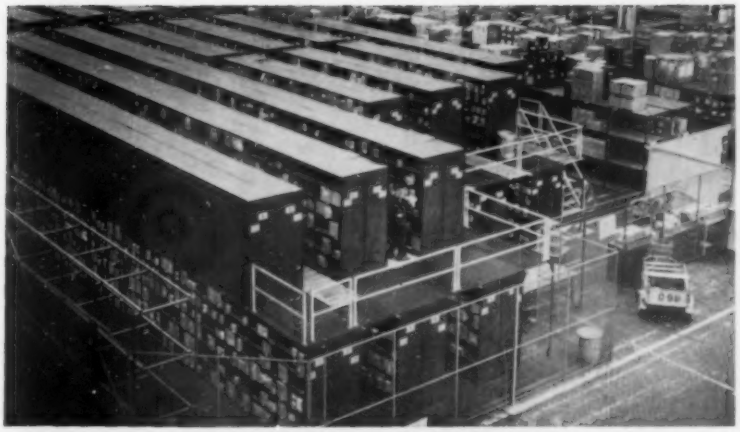
The new system uses 8-ft. Power Groove fluorescent lamps (General Electric Company, Cleveland). They're mounted in a channel-type single lamp fixture (Silvray Lighting Company, Bound Brook, N. J.) and give 70% upward light.

The lighting units are shielded by recessed concrete beams separating the bays. This gives the effect of an architecturally integrated system. The ceiling above the lights is painted a dull white. This gives the effect of a luminous ceiling, at the same time eliminating glare.

Quality Story Put in Lights

Traffic lights tell the quality story at Westinghouse Electric Corporation's Columbus, Ohio, plant. A green light in the plant's cafeteria informs workers that the quality of their work is up to snuff.

But when the red light begins to flick, it's a sign to get on the ball. It means that unusually large quantities of rejects are starting to show up on production lines.



DOUBLE-DECKER BINS SAVE SPACE

These two-tier storage bins for government-furnished parts at Lockheed Aircraft Corporation's Marietta, Ga., plant are neat and easily accessible. They are real space-savers, too. The cost of fencing and storage space is halved by stacking the bins two-high. The upper bins are reached by a grating stairway and a safety rail system that was designed by Lockheed. The lower bins support the entire weight of the upper tier, the grating, and the railings.

Range Finder Beats Climbing Poles

You don't have to climb poles or use "skyhook" measuring sticks to find pole cross-arm height, clearances, or cable sag at Du Pont Company's Penns Grove, N. J., plant.

Line crews get accurate (within 2%) measurements quickly from the ground through an inexpensive overhead range finder (Edmund Scientific Company, Barrington, N. J.) The pocket-size optical device enables construction crews to know—before they climb the pole—how much room they'll have to work in between pole hardware and cross-arms.

Source: W. F. Lippincott, Electrical Supervisor, E. I. du Pont de Nemours & Co., Penns Grove, N. J.

Ceiling Projector Focuses Layout

An optical projection method makes layout of big steel plates fast and easy at Allis-Chalmers Manufacturing Company's York, Pa., plant. Key to the system is a projector mounted on the ceiling—50 feet up. Here's how it works:

Layout drawing is made with precision instruments on a 1 to 10 scale. Nesting of irregular shapes is done right on the drawing to minimize steel waste. The drawing is then photographed and reduced to a 3x5-in. negative.

This negative is projected to full scale on a steel plate by the rigidly mounted projector. A special elevator provides access to the projector cubicle.

The pattern projected on the plate is marked with a center punch and hammer. Written instructions are easily traced in paint. Where there are identical pieces, the negative is left in focus until all plates are marked. Chances of assembly error are reduced since more information appears on the negative than is possible with usual layout techniques. The negatives can be stored for re-use on duplicate jobs.

The method can also be used for microfilm photography of records.

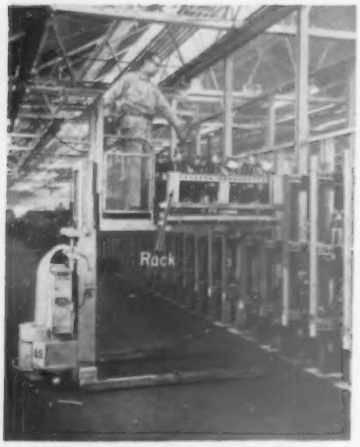
Super-Speed Grinder

A recently installed 18,000-rpm. air-powered grinder is matching the speed capacity of abrasive grinding wheels at Mid-Continent Steel Casting Corporation's Shreveport, La., plant. The new machine handles 50% more work with greater efficiency than the old 12,000-rpm. tool it replaced.

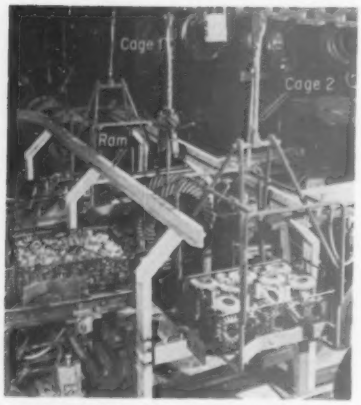
The resinoid bond grinding wheels used in the plant can be run at surface speeds up to 9500 feet per minute. The 12,000-rpm. grinder approached that speed with a 3-in. cone, but with a 2-in. cone the speed dropped under 6300 fpm.

The 18,000-rpm. machine (Ingersoll-Rand Company, New York) is operating at 9500-fpm. speed with the 2-in. cone. This means a saving of more than $572.50 a year in labor costs on each machine.

Ideas Plus Cash=Better Handling



1. TRANSPORT WITH RACKS.



2. TRANSFER BY AUTOMATION.

Ingenuity, plus a few dollars well spent, adds up to a potent combination in any industrial operation. It has paid dividends in the form of a streamlined efficient material-handling system at Eaton Manufacturing Company, Cleveland. Here are two examples:

1. Storage racks have been modified by company engineers to eliminate double handling of differential assemblies—from assembly line to rack and from rack to storage areas. The old method of handling caused damage to the parts and posed storage problems. It also required a fork truck driver to deliver the empty racks to the storage area. This ate up time.

A transport rack (top photo) which fits on an elevator-type rider truck, now does the job. An operator picks up the assemblies at the end of the line, delivers them direct to the storage rack, pushing them off the truck and onto the storage racks in their proper places. Besides converting double handling into single, the new system has eliminated need for storage space on the floor and considerably reduced damaged parts.

2. Automatic conveyor transfer has greatly simplified the loading and unloading of lubrite equipment. Carrier baskets of raw materials go by overhead conveyor (lower photo, Cage 1) to a roller conveyor. A ram actuates a switch each time a basket reaches the point of intersection of the two conveyors. This pushes the basket from overhead conveyor to roller conveyor.

The system works exactly in reverse for baskets of completed parts. They're carried down the roller conveyor and automatically transferred to the overhead conveyor by a switch (Cage 2). The automatic features of this system cost Eaton $3500 to build, but labor and time savings paid back that sum in the first year of operation.

Industry's Housewife

Hair dye, eyebrow tweezers, clothes pins, and margarine could be just items on the shopping list of any housewife en route to the neighborhood store. But they have some unusual uses outside the home, too. For instance, they're tools of production and maintenance throughout the General Motors Corporation organization.

Some intriguing examples:

Oleo is used at the Packard Electric Division to coat battery straps and thereby prevent acid corrosion.

At Delco Radio, clothes pins suspend cords of electric soldering irons, eyebrow tweezers pick out lead wires in coil assemblies, and plastic catsup bottles are lubricant containers and applicators.

Lint is used at Frigidaire Division to check filtering devices in automatic washing machines.

Hair dye is marking gears and assemblies at the Chevrolet plant, and electrically charged marbles are dust and lint catchers.

Finally, here's one use never foreseen by the inventor of nose rings for hogs: to attach temporary identification tags to machinery at the Oldsmobile plant.

Feeder Doles Out Stingy Portions

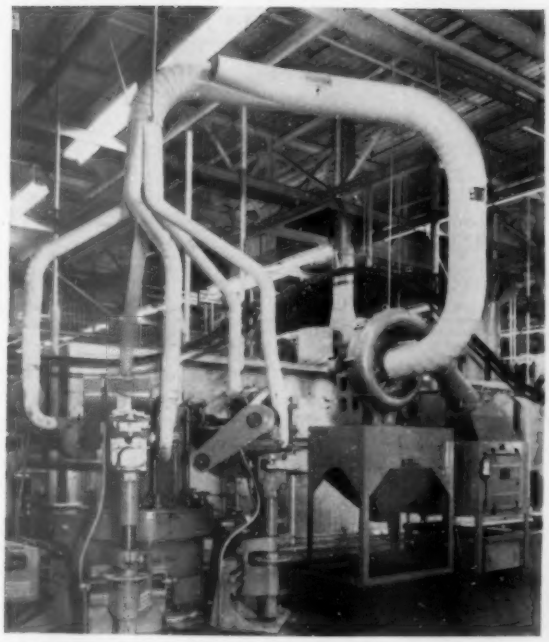
Just enough material to do the job is the motto at H. K. Porter Company's Ambridge, Pa., plant. Six feeders (Vibra Screw Feeders, Inc., Clifton, N. J.) are the key.

Formerly the company added a weighed amount of color chips to plastic in drums to produce tinted wires. Drums were transported by fork truck to an extruder area and machine-tumbled. But this resulted in an uneven distribution of color. One-third more of the expensive chips had to be used just to guard against color fadeout.

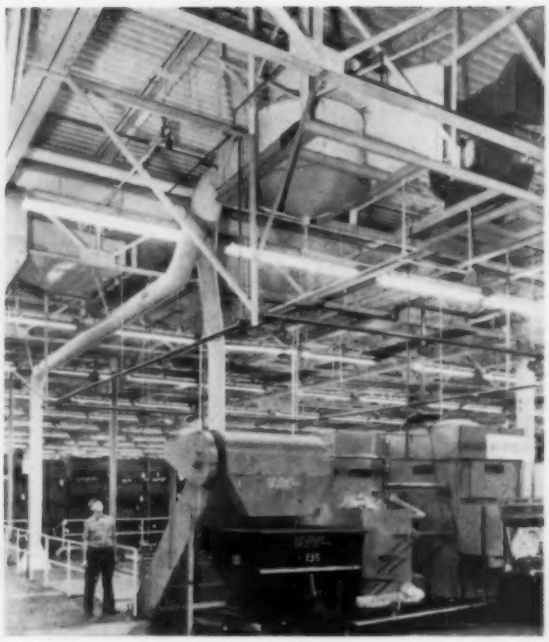
Now the feeder screw supplies a predetermined amount of chips to the plastic continuously or by programed cycles. It employs density control plus volumatic metering.

Here's how it works: Color chips are loaded into the feeder hopper. Micrometer adjustment controls are set for the desired speed and density of flow. Vibration completely fills and then empties the screw with the chips. This provides an unvarying measure of the amount of chips fed into the mixture. Thus the worker has complete control over volume and rate of speed.

Results: Elimination of the tumbling operation. A saving of $4400 a year on color chips. Better control over color uniformity.



ANODIZING. Dual tank exhaust systems are used here for maintenance reasons. One handles corrosive acid fumes, the other controls alkaline exhaust. The tank is completely surrounded by hoods, preventing fumes from reaching the working area and harming personnel.

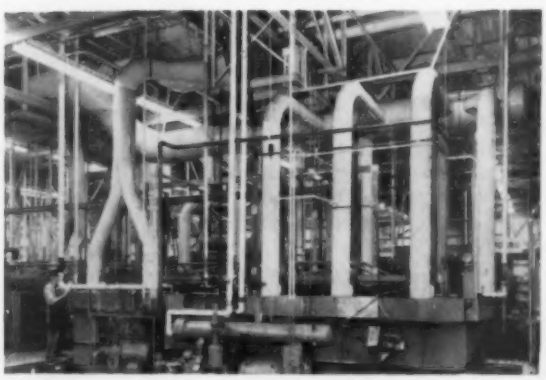


TOOL GRINDING. Here a collector was installed to handle metal grinding dust. A centrifugal pre-cleaner removes heavier particles while finer dust is collected in the oil bath at the right. Air is returned directly to the room—a heat and coolth saver.

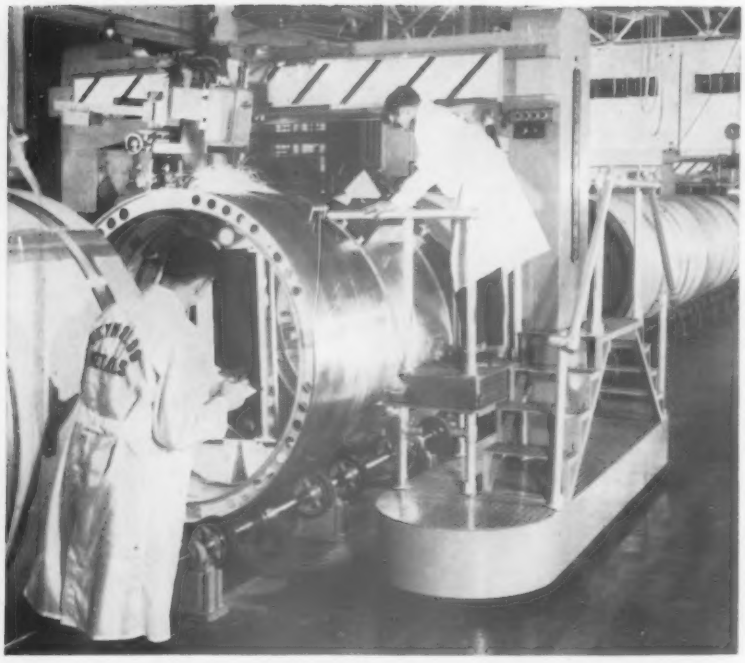
Department Dust Control Conquers Space Problems and Cost Barriers

Deciding between central or individual dust control? Both were nixed at Ford Motor Company's 37-acre Sharonville, Ohio, plant. Distances between departments made centralization impractical. Individual control was too costly. Ford settled on a departmental system. The installation (Kirk & Blum Manufacturing Company, Cincinnati) handles 2,795,000 cfm. of exhaust air—about 10 tons—every 60 seconds.

QUENCHING. Heavy mineral oil fumes and vapors in this department are condensed, agglomerated, and drained away by the air-actuated centrifuge installed in the rafters. Clean, filtered air is returned directly to the working area at right. This also saves heat.



BRUSHING. Individual exhaust hoods are used for this operation. They're designed to permit maximum setting of the wire brushes. Each machine has its own dust control system, consisting of a Rotoclone collecting device followed by a secondary after-cleaning.



Gantry Welder Rolls to Jobs

This gantry welder combines the stability of a fixed unit with the flexibility of a movable one at the Reynolds Metals Company Missile Plant (Sheffield, Ala.). It's used to weld aluminum shells.

All of the basic welding equipment is mounted on the gantry, which straddles the shells and can move up to 180 feet, at a speed of 33 feet per minute. On one side of the unit are two semi-steel V-groove wheels running along a single inverted angle iron track. These are connected to the driving motor by means of chains and sprockets, and serve both to guide and drive the welder. On the other side are two rubber-tired free rolling wheels running along the concrete floor.

The shells are rotated by a series of perfectly matched friction driving wheels along the floor track, with control in the hands of the welding operator.

Before the development of the gantry, the girth welding unit was often tied up for hours while the shells were aligned and the weld back-up bars installed.

With the gantry welder, work can be done at as many as 10 different points along the floor track. The welder rolls into position only when shell parts are ready for welding.

A bank of fluorescent lamps, mounted inside the crossbar of the superstructure, floods the work area with light. Air and power are supplied to the welder through an overhead track and trolley system.

Device Re-Positions Grinding Wheels

Production wear on wheels of a disk grinder is automatically detected and compensated for at Schiller & Pfeiffer Company, South Hampton, Pa. A device that incorporates a motion transmitter and control relay (Automatic Timing & Controls, Inc., King of Prussia, Pa.) is the key to the system.

The motion transmitter measures the thickness of each piece after grinding. As the grinding wheels wear down, a thicker measurement is given. This deflects the transmitter, causing an electric signal which activates the control relay and re-positions the wheels in increments of 0.001. This system requires only the part-time supervision of one man.

Under the old method one man fed stock. A second man measured each piece, then manually positioned micrometer dials to insure consistent tolerances.

Production rates have increased approximately 25% with the new method because it has speeded inspection. This system can also be used by any plant involved in grinding flat stock. And the principle of detecting a change in dimension or position with a motion transmitter has applications in the paper and textile industries.

Testing by Vibration

The principle by which a glass will crack from sustained vibrations of the human voice is being used in testing at Tube Turns Division of Chemetron Corporation. The probable life span of metal pipe is being determined in minutes at the Louisville, Ky., plant by the resonance bending technique.

Pipes set to vibrating in their natural resonance frequency literally shake themselves until they crack from fatigue or exhaustion. Pipe or fittings with ½-in.-thick steel walls can be vibrated to point of failure in less than an hour.

This technique closely simulates the stresses and strains normally encountered in years of plant service. Forced vibrations emanating from unbalanced weights spun at cycles of several thousand rpm. by an electric motor induce a sympathetic vibration in the pipe at its natural resonant frequency.

This method is five to six times faster than cyclic bending of steel pipe by mechanical means or pulsation application of water pressure. And it requires less capital outlay, power, and maintenance.

Cover Picture

1. LEARNING BY SOUND AND SIGHT... 2. ANALYZING WORK THROUGH MOVIES.

Audio-Visual Methods Keep Assembly Humming

Motion-picture cameras, slide projectors, and recording machines are all efficient tools of management at Eclipse-Pioneer Division of Bendix Aviation Corporation, Teterboro, N. J. These tools are used to (1) train assembly workers and (2) analyze work techniques. Results have been excellent.

1. Automated on-the-job training for assembly-line workers is provided by a recorded tape playback machine (DonnLu Siegel Corporation, Jackson, Mich.) and a 35mm slide projector (Bell & Howell Company, Chicago). The tape has verbal instructions that are illustrated at intervals with automatically indexed color slides projected on a screen in front of the trainee.

The worker is instructed not only on the method to be followed in assembling an intricate mechanism, but also in job know-how. This means he is learning by doing and is able to produce immediately. He becomes a well-rounded employee.

The individual trainee can set his or her own pace. Each person is at all times in complete control of the speed at which the instructions are given. A foot lever controls the instructions according to each one's learning ability. Instructions can be stopped or, by rewinding the tape, repeated at will.

A methods engineer is responsible for devising the sequence of instruction. A script notes where obstacles may be encountered or extreme caution is needed. Pictures are taken to illustrate the points in the mechanism from the same angle as the trainee will view them.

The Vid-E-Aural instruction is continued through as many repetitions of the operation as necessary to achieve the desired degree of expertness. This instruction program is paying a four-way dividend:

- 50% cut in learning time.
- 80% decrease in attention required from lead man.
- Improvement in uniformity and quality of product.
- Increase in workers' versatility.

2. On-the-spot analysis and evaluation of each operation is made by management with a view to cutting costs. Using movies as a medium, management gets a fairly comprehensive look-see at what's happening on the assembly line. Twice a week top brass of the plant meet as a committee to view films of one or more assembly-line techniques. This decision-making body can institute changes in work procedures, product or equipment design, and many other factors leading to a more efficient and safe operation.

Each work situation is filmed by a volunteer in a special laboratory under simulated operating conditions. No union objections have been raised. Through the use of a Zoomar lens and a variable speed industrial camera, the committee can get a close-up of the operation and can slow the film down to any speed. The film is normally run at faster than actual work speed to save time.

The following always attend the showings: Product engineer, methods engineer, material handling engineer, assembly superintendent, assembly foreman, cost estimating engineer. The factory manager, assistant general manager, and director of quality control, are also usually present at each session. A purchasing liaison engineer attends when the subject is a pertinent one.

Letting Workers in on Cost-Cutting

Employees are never allowed to lose sight of cost-cutting objectives at Republic Aviation Company's Farmingdale, N. Y., plant. Reminders are before their eyes at all times. Republic is currently on an economy drive to slice the price of one of its products by 30%.

Each worker is reminded of the cost of the material he uses. This is done by mounting small pieces of the materials on display boards and printing their prices below to emphasize the high cost of scrap.

Charts mounted near the assembly line spell out to shop personnel the over-all goal. The charts also give information on the day-to-day effectiveness of the program and its progress to date.

YOU BE THE ARBITRATOR

THE CASE OF

The Giant Cup of Coffee

Out of the experience of the American Arbitration Association

One afternoon Steve P., a platform helper in an air-conditioning manufacturing plant, wandered off to a nearby café for a cup of coffee. The facts as to how long he was gone were in doubt. He said 15 minutes. The company said more like an hour. And proceeded to hand Steve a dismissal notice. It claimed that he not only left work without permission, but that in failing to punch out he showed he intended to let the company pay for unworked time. This, said the plant manager, was "dishonesty" and justified immediate dismissal.

A grievance was filed. The union admitted Steve had broken a company rule but said that discharge was too severe a penalty for a first offense.

"First offense nothing," answered the plant manager. "Just look at this record." He then produced a complete dossier, showing that Steve made a habit of breaking every rule in the book, from smoking where he shouldn't to loafing on the job.

This took the union by surprise. "Keeping a secret file on a man is a sneaky thing to do," the shop steward complained. "And that's just one more bit of evidence that you were discriminating against Steve."

Eventually, the case went to arbitration under the rules of the American Arbitration Association. Suppose you were the arbitrator. How would you rule?

For the actual decision turn to page 288

GIANT PRECIPITATORS COMBAT DUST AND FUMES

These three mammoth electrical precipitators are removing 99.8% of dust and fumes from waste gases at Kaiser Steel Corporation's Fontana, Calif., plant. They're located between the furnace exhaust ducts and the fans serving the three stacks at the right. The precipitators (Research-Cottrell. Inc., Bound Brook, N. J.) handle 607,500 cubic feet per minute of gas coming from the oxygen furnaces. The results can be seen in the lack of smoke coming from the stacks.

Big Picture Spots Welding Defects

A continuous fluoroscoping process, monitored on a TV screen, pinpoints any flaws in the welded seams of steel pipe at U.S. Steel Corporation's National Tube Division, Pittsburgh.

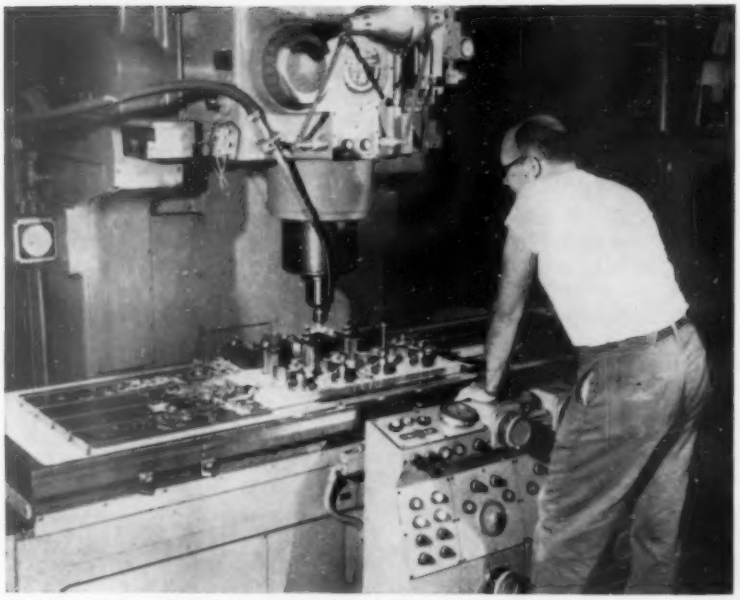
The fluoroscope unit contains an x-ray head that casts a shadow image of the weld on fluorescent screen of an image intensifier. There the image is amplified electronically and picked up by a television camera. The greatly enlarged picture is then viewed by the operator on a monitor screen.

It works like this: Sections of the welded pipe are placed on a carriage that travels past the inspection booth. The x-ray head, mounted on a boom, is placed inside the tube, in line with the welding seam. As the pipe passes the booth, the image is flashed on the fluorescent screen.

The position of the pipe is controlled by the operator inside the booth. He can slow or stop the movement of the carriage for close examination of any part of the weld. If a defect is spotted, the push of a button will spray water-soluble white paint on the pipe at the exact position of the flaw.

The old system used x-rays but only the end portions of each pipe section could be reached for checking. Also, the method required the placement and development of film, which took considerable time.

With the fluoroscope unit U.S. Steel now has a foolproof quality control system.



Numerical Control Cuts Job Time

When Aeronca Manufacturing Corporation, Middletown, Ohio, had to shift from aluminum to steel hinges, time was the critical factor in the changeover. Numerical program control cut the transition period from weeks to days.

The hinges are hogged out of blocks by a numerically controlled Hydro-tel (Cincinnati Milling Machine Company, Cincinnati). Each hinge requires two parts, one the mirror image of the other.

The entire machining sequence was worked out in 80 hours by means of a desk calculator and trig tables. It has been set up on 1800 punched cards, arranged in decks for roughing cuts and finishing cuts. The same cards are used for either hinge side, the numerical-control circuit making the necessary mirror-image conversion.

With programing, it takes only about three hours of machining time with high-speed tools to mill each hinge. This process includes three cutter changes. A switch to carbide cutters in the near future is expected to cut machining time one-third. A positioning fixture, which permits one cutter to handle eight parts before a change is required, virtually eliminates downtime for setting up parts. While the cutter is handling one set of four parts, the operator has plenty of time to remove a finished set and load another four blanks.

The operator is far from obsolete in this job. Though much of his mechanical work has been eliminated, he still remains in control of the feeds and speeds. He loads and unloads parts, replaces cutters, and changes decks of punched cards as needed.

To start the operation, a worker bolts the stock to the Hydro-tel, and aligns the machine to the program merely by twisting a dial.

It's Safer at Work

How safe is your plant? The answer may surprise you. Workers are about twice as safe at work as during off-duty hours, according to a survey of employees at Buick Motor Division of General Motors Corporation, Flint, Mich.

Last year Buick had only 1.06 lost-time accidents for each million hours worked. This contrasts sharply with the 2.15 figure for each million hours spent off the job. There were 649 lost-time days due to home accidents, as compared to only 335 lost days caused by plant mishaps per million hours.

Biggest cause of accidents: Falls. They accounted for some 35% of off-the-job accidents.

CASE BOOK CAPSULES

Artificial elements produced in large quantities by underground atomic explosions may be a future source of valuable isotopes, according to Martin Co., Baltimore, Md. Such isotopes can be used in thermoelectric conversion devices to provide decades of electric power to unmanned transmitters.

Plant workers of the future may just throw their work clothes away after wearing, if experiments by Scott Paper Co., Philadelphia, work out. The company envisions disposable paper garments.

A giant stripping shovel, with a 210-ft. boom (56 feet higher than the Statue of Liberty), is being built for Peabody Coal Co., St. Louis, Mo. Shovel (Bucyrus-Erie Co., South Milwaukee) will weigh 14-million pounds, have a 115-cu.-yd. dipper capacity.

Hot cracking in stainless steel and other alloys can now be predicted by an inexpensive fast method devised by Westinghouse Electric Co,. Pittsburgh.

High purity tungsten can easily be plated on metal surfaces with a procedure recently developed by the National Bureau of Standards. This involves reducing gaseous tungsten hexafluoride with hydrogen by passing it over the heated object to be plated.

A hypersonic shock tunnel that shoots a bullet of air through a test chamber at 16 times the speed of sound has been built by Cornell Aeronautical Laboratory, Inc., Buffalo. Charge is helium gas under high pressure.

Stable plastic that withstands 750 F. temperatures may be produced from synthesis of a new type of molecule at American Potash and Chemical Corp., Los Angeles.

A solar-powered automobile has been developed by International Rectifier Corp. of California, Los Angeles. Sun energizes electrons in 10,000 silicon cells.

Stumpy Stack Works Like a Skyscraper

This streamlined smokestack is doing the job of a conventional chimney one and a half times its size. It belongs to Pennsylvania Electric Company's Seward, Pa., generating station.

For efficient operation the station needed a 100-ft. extension to its 214-ft. stack. This would have meant waiting until the station's normal three-week shutdown period. And the proposed extension would have made the stack much more vulnerable to high winds.

This 10-ton stainless steel nozzle (Aerotec Industries, Inc., Norwalk, Conn.) proved the answer. By choking down the stack diameter, it at the same time increased the velocity of the exhaust gases. This produced the same results as the 100-ft. extension would have.

A flexible Vitron seal (Du Pont) attached to the inner brick of the chimney solved the problem of wind sway of the outer concrete coat on which the nozzle rests.

Dietitians' Menus Melt Away Fat

Excess weight not only gives a slovenly appearance to an employee, but can cut years off his life. To combat obesity, Eastman-Kodak Company, Rochester, N. Y., employs four dietitians to plan individual balanced diets for workers with weight problems. Those who are underweight get diets to help them gain.

The reducing diets are by no means starvation fare. They're geared to give plenty of the right foods that provide pep throughout the day, cause no production slowdowns. Dairy foods, meats, vegetables, fruits, cereals, and breads are included in all diets.

The anti-obesity program also provides stories to the company house organ that publicize the dietitian service. And it supplies weight charts that alert roly-poly and skinny workers to the fact that they're approaching danger zones.

Enclosing Machine Racks Big Dividends

Converting an open type hood on a drying machine to a complete enclosure is paying multiple dividends at West Virginia Pulp and Paper Company's Covington, Va., plant. Production has risen 10% and steam consumption dropped off 5%.

The company formerly used the traditional peaked roof, hipped at each end, and 7-ft. side and end curtains that extended to within 6½ feet of the floor. In making the changeover to complete machine enclosure, the hood was retained. However, side and end aluminum insulated panels were installed to enclose the space between the hood curtain and the floor.

These panels can be raised for servicing in sections or as a group by motors on the roof of the hood. They're raised automatically in case of a breakdown. The side panels have windows; the end panels have a door for personnel entrance. Basement space beneath the machine has been sealed off.

Besides increasing production, conversion of the machine has paid off in these ways:

- Air volume required to carry off evaporated moisture has been cut 40%. Two of the six fans have been eliminated and the remaining four operate at slower speeds. Formerly, the greater percentage of air circulated through the machine was room air. Now that the enclosure is cutting off most of this supply, West Virginia Pulp and Paper is using outdoor air. This is heated to a predetermined temperature, and ducted into the machine enclosure.
- Working conditions have improved. Wet-end room temperature has been cut about 15%. It used to run as high as 100 F., now seldom exceeds 90 F. Humidity used to hit 80%, now doesn't rise above 70%.
- Quality of product has improved due to the uniform moisture resulting from the change.

J. O. Ross Engineering Division of Midland-Ross Corporation, New York, handled the conversion.

No-Swim Pool

There'll be no swan dives in this portable plastic pool at Automatic Electric Company, Northlake, Ill. It's used for the temporary deposit of zinc plating bath solution during periodic cleaning of the solution's storage tanks.

The old system of draining required the use of several smaller tanks and the rental of one hundred 55-gal. drums (at $1 each per day for three or four days). Five or six men were needed for the job.

It takes only two men to fill and empty the swimming pool. When the job is finished the pool is removed to a storage area until next tank cleaning day.

1. DEBURRING BY BLASTING.

2. FLOWING OIL ON CONVEYORS.

Do-It-Yourself Shop Formula Pays Off in $$

3. AUTOMATING WELDS.

4. MAKING CLICKS LOUDER.

A little imagination can go a long way in any plant operation. At Borg & Beck Division of Borg-Warner Corporation, Chicago, a wholesome dose of do-it-yourselfitis is paying dividends. New devices and systems instituted by shop personnel have stretched production and maintenance dollars considerably.

Here are four examples of ingenuity in the plant:

1. This deburring cabinet automatically removes burrs from the machined edges of an aluminum die-cast stator. The piece is loaded on a chute set at approximately a 15-deg. angle. When the machine is free the piece rolls down in front of a plunger. This activates a switch that causes the cabinet door to open. The plunger moves forward, picks up a piece, moves it along to contact a motorized spindle that makes the piece revolve. A blast of dry abrasive removes burrs.

After a predetermined time, the doors open, the cylinder retracts, and the piece is stripped, causing it to roll down a discharge chute. This, in turn, actuates a switch that indicates the machine is free for another cycle. This plant-made machine replaced a time-consuming hand-brush operation.

Payoff: It has cut costs, improved product quality.

2. Oil circulating pump flows compound over blanks. Borg & Beck installed a conveyor between the blanking and forming press with the pump constantly flowing the lubricant over the parts as they feed into two rubber rollers. This eliminated the services of one man to swab the compound on the blanks before the drawing operation.

Payoff: Costs were reduced 30%. And control of amount and distribution of compound is improved.

3. Automatic welding has been set up by means of an inexpensive air-operated index fixture. This home-made device is being used as a standard gas generator and welding gun. Here's how:

A wire is fed automatically to create a spot weld between the ring gear and cover. After the piece is loaded, the operator presses a start button. The welding gun moves into place, makes one weld and retracts. The fixture indexes, and the cycle is repeated for 12 spots. A cam on the side of the fixture automatically stops the cycle after 12 indexes. While the welding is taking place the operator is free to perform other tasks.

This operation used to be done manually with the same equipment.

Payoff: Production has been upped 50% with better quality welds.

4. Making critical clicks on a fixture audible is done with a contact microphone. This means the operator can hear the sounds despite the surrounding high noise level. The mike (Radio Corporation of America, New York) was installed on a fixture that tests clutch assemblies. It amplifies the clicks so they sound like shots.

Payoff: There's no possibility of the operator's mistaking the sound for other shop noises.

Source: M. D. Gabbert, Master Mechanic, Borg & Beck Division of Borg-Warner Corporation, Chicago.

ROBOT READS AND WRITES THE TEMPERATURE

This portable temperature reader and printer is cutting production testing time 25% at General Electric's Medium AC Motor and Generator Department (Schenectady, N. Y.). The device can read up to 50 thermocouples at pre-set time intervals, then calculate and print each temperature automatically. G-E engineers built the unit from standard parts. It weighs 500 pounds and can be easily wheeled to different test locations. The readout can be punched on tape or typewritten, eliminating any possibility of misread handwriting. At any time during the test the typewriter can be manually operated to print headings for the temperature records.

Alerting Workers to Competition

Most workers are pretty well hep to what is going on in their own plants. In-plant communication and the ever-present grapevine usually see to that. But Magnetic Metals Company, Camden, N. J., also tells its workers how its competitors are doing.

A bulletin board in the manufacturing area displays advertisements, stories, and other data concerning the company's direct competitors. This lets employees in on the problems of running a business, shows them that the competition is not asleep. It also alerts workers to the necessity for quality and productivity to maintain or improve the company's position in the industry.

Writing Is Obsolete at This Tool Bin

A charging-plate machine has solved the frequently tough problem of deciphering employee handwriting at Lockheed Aircraft Corporation's Marietta, Ga., plant. The machine is used whenever a tool is taken from standard stores.

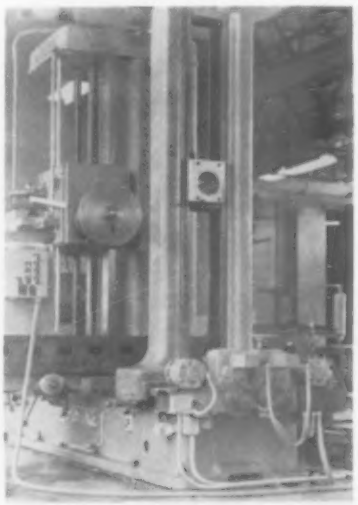
Each tool bin has a charge-plate lying among the equipment. When a tool is taken, the employee also removes the plate, stamps it on a tool request form (left photo).

The three-line plate gives specification number, description of tool, material code number, and the bin's location in the storeroom. After the form is stamped, the plate is returned to the bin.

The mobile stamping machine is mounted on a roll-around cart. Six such machines, costing $149.50 each, are used in Lockheed's standard tool stores department. The plates cost 3.3 cents each.

Use of these machines and charge plates has not only cut down on bookkeeping errors but has also reduced time-per-tool pick-up.

Reprints of the Plant Operating Case Book are available. Price 50¢. For quantity prices, write Reader Service Department, FACTORY, 330 W. 42nd St., New York 36.



Tracer System Halts Downtime

Downtime of machinery used in the grinding of contoured rubber shells has been considerably reduced with the installation of an electro-mechanical tracer system at Garlock Packing Company, Palmyra, N. Y.

An electro-hydraulic system was formerly used by the company. The trouble was that downtime averaged 1½ to 2 days per month, due to dust, corrosion, and the complexity of the system.

The new tracer system (Seneca Falls Machine Company, Seneca

Falls, N. Y.) eliminates all critical assemblies, leaving little need for adjustment. Completely sealed, it's unaffected by dirt and chips.

It works like this: The rubber forms are fitted over an aluminum mandrel on a large boring mill. The grinding wheel removes stock in answer to signals received from the tracer stylus that maintains contact with the metal template. A tolerance of 0.005 inch is required for the operation. After grinding is completed, aluminum inserts are mounted into preformed openings in the shell. Then they're turned down flush with the rubber surface, once again by signal from the tracer template.

If there's mechanical or electrical trouble during the operation, the system stops immediately. This prevents possible serious damage to the equipment.

REELS KEEP HOSE OFF THE FLOOR

Storing hose on overhead reels licked safety and cost problems at Peter Eckrich and Sons, Ft. Wayne, Ind. Washing down the floors with hose is a vital task in any food-processing plant. But finding a place to store it can be a knotty problem. It was essential for Eckrich to get the hose off the plant floor since it could create an accident hazard to fork trucks and personnel in the area. Coiling the hose on hooks was tried, but proved inefficient. Seven overhead reels (Clifford B. Hannay & Son, Inc., Westerlo, N. Y.) finally did the trick. Each reel can handle 60 feet of hose. Automatic rewinding also cuts down on handling time.

Mat Gives Shine to Shoe Bottoms

Dirt can be a prime stumbling block to efficiency in any plant—especially in one that makes electrical equipment. This shoe mat partly answers the problem at C. P. Clare & Company's Chicago plant.

Originally, the company experimented with the use of synthetic fiber foot coverings. But employees complained of discomfort from the heat and swelling feet.

Now mats are at two locations—right inside the employee entrance and outside the clean room. As workers walk across each mat at normal pace, an assembly of nylon brushes moving at 432 strokes per minute remove particles from shoe bottoms to a pit under the mat. The dirt is then vacuum-exhausted to the open air.

Thinking Quality

Quality is a state of mind, according to top management at the Franklin Park, Ill., plant of Motorola, Inc. In line with that philosophy, the company has instituted a series of monthly quality poster contests for its employees.

Awards are given for the posters and slogans that best get the idea of quality across to workers. The two monthly winners are taken to dinner and receive a pen-and-pencil set, engraved watch, or portable transistor radio.

Source: Charles Nemec, Plant Manager, Motorola, Inc., Franklin Park, Ill.

COMING—
JUNE CASE BOOK

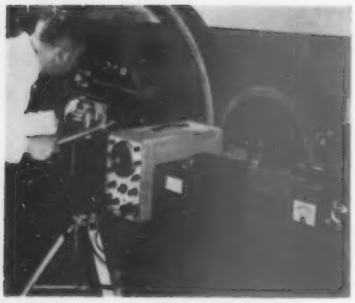
Read how the installation of a few mechanical devices meant improved operations at Motorola, Inc. Chicago. Most of them are inexpensive and applicable to any plant.

Any-Size Storage

This storage rack at Springday Company (Springfield, Mo.) was laid out before the exact size of the cartons was established. Usually the carton size determines the width of a storage rack.

With Springday's special rail storage system (Alvey Ferguson Company, Cincinnati) the width of the cases can be changed simply by moving rails from one side to the other. And no fastening is required —rails stand up by themselves.

The rack could be profitable for any plant whose carton sizes are subject to frequent change.



Radiation Tells How Hot

There's no need to shut down a machine to determine the temperature of rapidly moving items at Gates Rubber Company, Denver. The surface temperature of this rotating tire is being taken by a Thermodot radiation thermometer. The device (Radiation Electronics Company, Chicago) continuously measures temperature without any physical contact.

Thermal patterns are registered on an adjacent oscilloscope for both direct observation and photographic recording.

The Thermodot is sensitive to the thermal radiation emitted from the tire. Mirrors focus this radiation on an infra-red detector. This, in turn, generates a signal voltage proportional to the radiation indicator. The signals are converted to temperature readings with a calibration chart.

Portable Pump Cleans Brickwood

With this portable trailer-mounted pumping rig, open-hearth furnace checkers can be cleaned with high-pressure water at Great Lakes Steel Corporation, Ecorse, Mich.

In the past the hot brickwood checkers were cleaned with 100 psig. of air. This was only partially satisfactory. A gradual build-up of matter not removed by the air blast required a manual cleaning every three months. It meant closing the furnace down.

The portable rig does the job now. It consists of a plunger pump (Worthington Corporation, Harrison, N. J.) connected to a 40-hp. motor reducer. Water is supplied from the mill water supply lines to the pump, and then to a multi-orifice cleaning nozzle at 970 psig. through a 25-ft. lance.

The lance is inserted into the checker banks where the high-pressure water-spray pattern goes to work. Manual cleaning is now a relic of the past.

Double Chucking in Three-Quarter Time

Performing two chuckings at once on a single lathe has speeded operations 28% at Hobart Brothers Company, Troy, Ohio. Aluminum flywheel housings are machined this way on a saddle-type turret lathe (Warner & Swasey Company, Cleveland).

After boring and chamfering the large seat diameter and smaller center bore, the housing is placed in a spindle fixture for rough and finish facing from the square turret. This fixture is mounted on the face of an 18-in. three-jaw chuck. A special three-cutter boring bar, which extends through the center hole of the workpiece, is centered on the fixture's face.

While this operation is going on, a second housing is clamped in a hex turret fixture for rough and finish boring and chamfering of the off-center starter hole. The hex turret is advanced to the revolving three-cutter bar and a feed is engaged in the apron. As the turret feeds toward the spindle, the rough boring cut, the finish boring cut, and the chamfer are completed—in that order.

This method has kept the cost of machining the part at the 1955 level, in spite of rising labor and material costs.

YOU BE THE ARBITRATOR

Continued from page 282

The award—The arbitrator said it was easy to see how the company would be provoked at all the offenses committed by Steve and would regard the most recent one as a "last straw." But it was his opinion that since the company had not disciplined Steve for the earlier violations, or even spoken to him about them, they could not be considered pertinent to this case. Therefore, Steve's absence and the attempt to collect pay for time not worked would have to be regarded as a first offense.

In view of the company's past practice for first offenses of that kind, the discharge was commuted to a two-week layoff without pay.

Caution: The award in this case is not an indication of how other arbitrators might rule in other apparently similar cases. Arbitrators do not follow precedents. Each case is decided on the basis of the particular history, contract, testimony, and other facts involved.

Contributions from readers reporting experiences will be welcomed. No need for fancy writing; just a clear, concise statement of facts. If you have photos or drawings, be sure to include. We'll edit for the Case Book. Contributions accepted will be paid for at time of publication. Address: Case Book Editor, FACTORY, 330 West 42nd St., New York 36.

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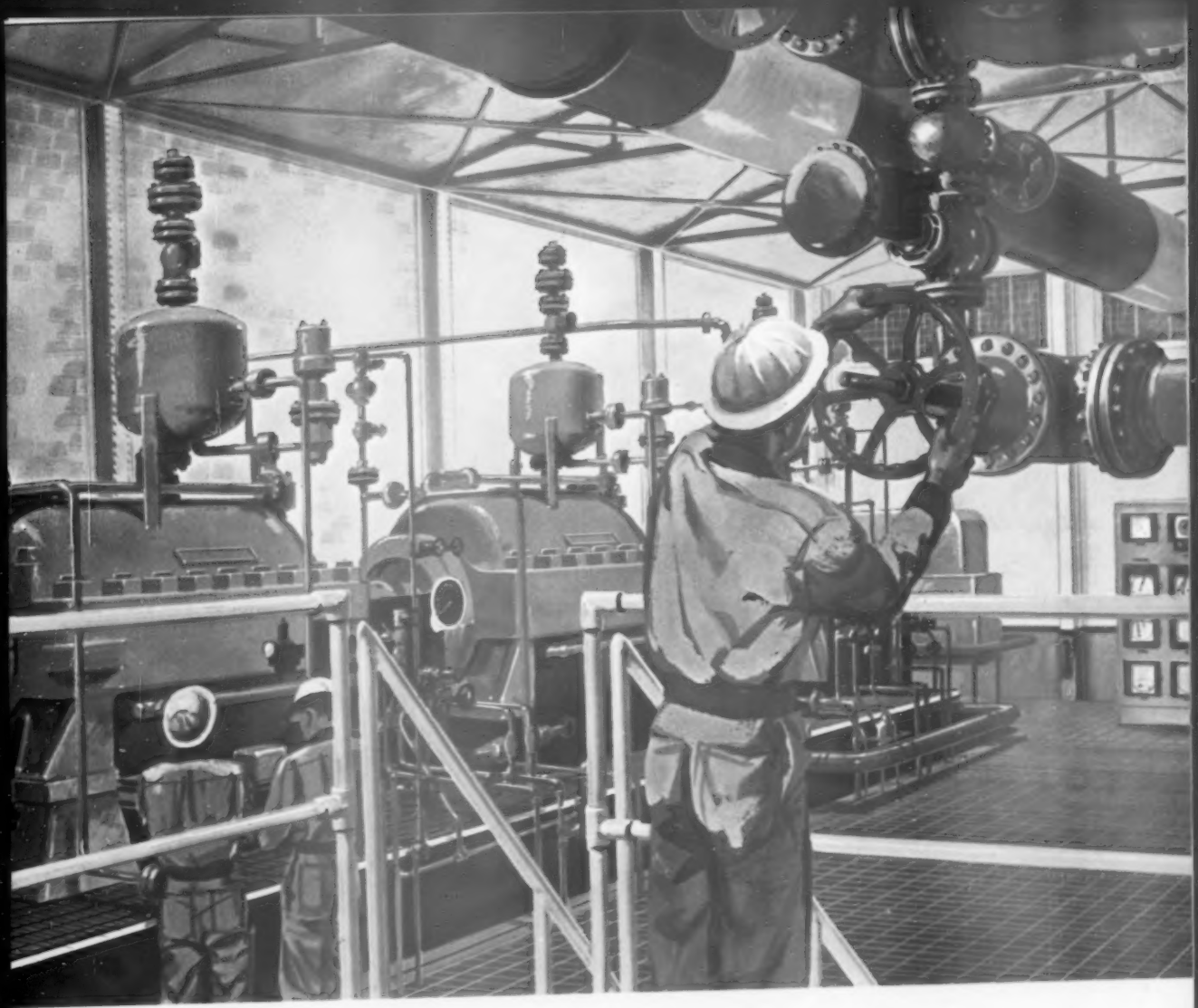

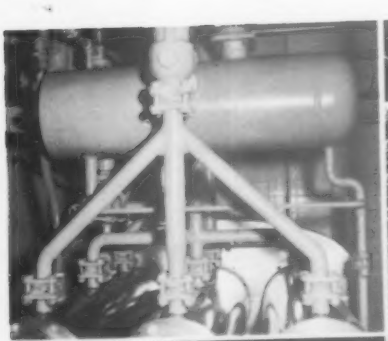

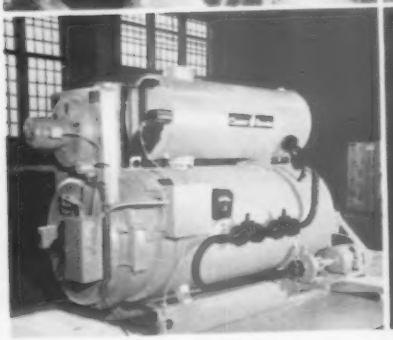

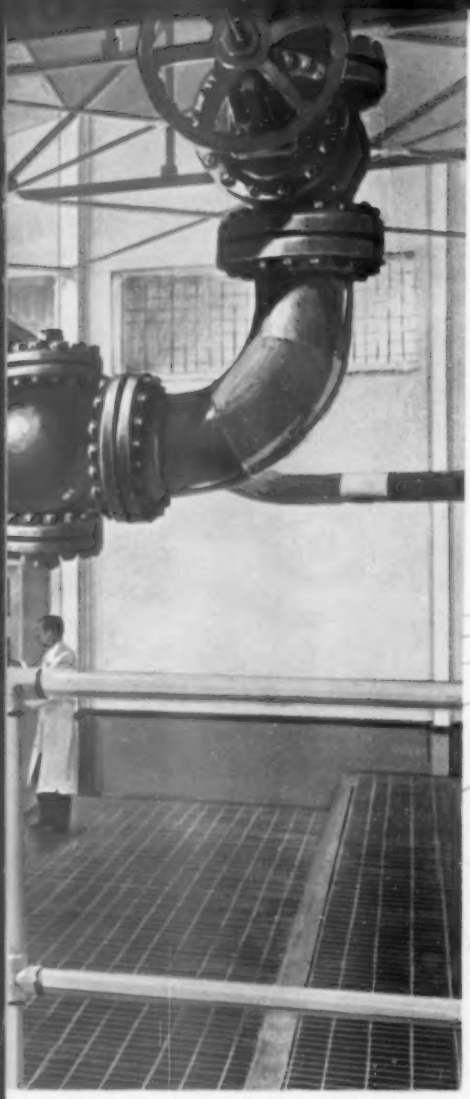

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RUST-OLEUM®

See our catalog in Sweet's.

STOP RUST by applying Rust-Oleum 769 Damp-Proof Red Primer directly over the sound rusted surface

Save time, money, and metal. Brush Rust-Oleum 769 Damp-Proof Red Primer right over the remaining sound rusted surface after scraping and wirebrushing to remove rust scale and loose rust. **Specially-processed** fish oil vehicle penetrates rust to bare metal as proved in radioactive tracing studies.

STOPS RUST!®

Distinctive as your own fingerprint. There are imitations, but only one Rust-Oleum.

Insist upon industry-proved Rust-Oleum. Accept no substitute.

You take the brush! Try a free test sample!

ATTACH TO YOUR LETTERHEAD

RUST-OLEUM CORPORATION
2985 Oakton Street • Evanston, Illinois

At no cost or obligation, please send me:

- ☐ New full-color catalog on New Color Horizons System and specialized Rust-Oleum systems, including color charts and applications.
- ☐ FREE TEST SAMPLE of Rust-Oleum 769 Damp-Proof Red Primer.
- ☐ Please have your representative contact us to discuss a plant survey.

from the ground UP

Colson®

builds it better...

Colson starts with the first essential, mobility, and begins building quality there with Colson casters. Seventy-five years of experience goes into putting together the *total* unit. Literally from the ground up, Colson builds it better, supplying the complete product and a complete line of lifting equipment. From casters to completion, each part of the Colson C/U Lifter is made with the careful precision that has made Colson famous for long-lasting quality. In the long run, quality costs less. Buy once, buy the best... Colson.

COLSON'S 75th YEAR OF PROGRESS

75 years of experience in supplying field-tested equipment and casters to industry and institutions. Millions of satisfied customers know and respect the name COLSON . . . synonym for quality.

COLSON C/U LIFTER...GETS MORE JOBS DONE, FOR LESS

Colson's sturdy C/U (crank-up) lifter can do dozens of different jobs, quicker and at less cost. Use it to lift, transport and feed dies, forms, shapes, plates or bulk, up to 1000 pounds, and to load and unload trucks, stacks of materials up to six feet high. The C/U Lifter is built to last, with all-welded steel construction, heavy-duty lifting cable, and drop forged swivel casters. Designed for ease of operation too, with heavy-duty winch, automatic brake lock and foot-operated floor lock. By far the most versatile machine in the shop, and so low in cost, it can be amortized for as little as 7¢ per day. Send for free, illustrated catalog today.

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MAIL the coupon for latest Safety Switch Bulletin

Square D Company, Dept. SA-103
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Please send me your latest SAFETY SWITCH BULLETIN

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THE ONLY COMPLETELY SAFE SAFETY SWITCH HAS VISIBLE BLADES!

Square D gives you Safety you can See!

• The men who pull the switches will tell you what can happen when a switch, *believed* to be open —*isn't*. A lot of things can happen—and every one of them is bad. Personnel safety is in jeopardy. Motors can single-phase. Machinery and work can be damaged. Down-time can skyrocket.

Doesn't it make sense to insist on Visible Blade construction which gives you a road block against any of those possibilities? Doesn't it make equally good sense to insist on the safety switch which gives you that construction—plus a lot of other performance advantages? Evidently it does, because *Square D switches have never been out of first place in more than 50 years!*

They cost no more...why settle for less?

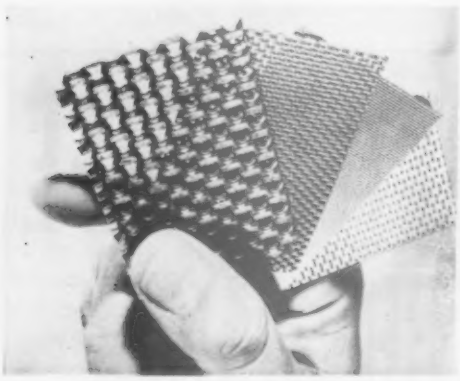
SQUARE D COMPANY

wherever electricity is distributed and controlled

FACTORY MATERIALS NEWS

For more about these items, circle numbers on Reader Service Card next to back cover.

These Pierced Metal Sheets Separate Solids

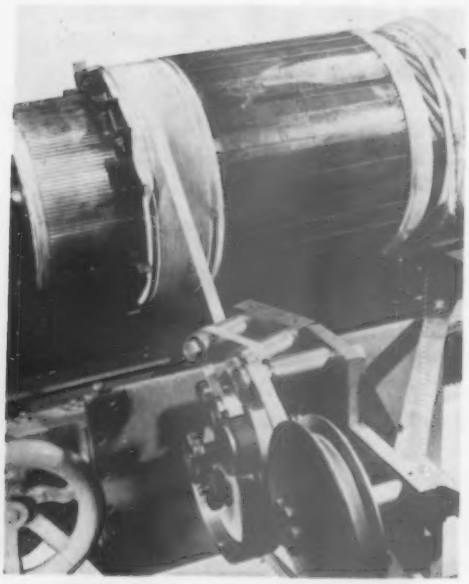


A pierced metal sheet, known as Conidure and made by a patented process, lasts up to three times longer than perforated metal for screening, recovering, or dewatering solids-bearing liquids passing through gravity or centrifugal separators. Trapezoidal holes are pierced in sheets of carbon steel, stainless steel, copper, brass, or aluminum. Sheet thicknesses can be up to seven times the hole diameter.

The working side of the sheet is available in several degrees of smoothness, from unrolled to rolled flat with electrolytic polish. This side, which has the smaller end of the tapered holes, also has humps that act like shovels to guide material to the openings and prevent clogging.

The pierced metal is available in sheets up to 31 in. wide or formed into shapes, cones, and cylinders; can be made with clamping grooves or turned edges. *National-Standard Co.* (Circle 473).

Thin Glass Tape Insulates Armatures



This B-stage polyester-treated glass banding tape is for armatures and other rotating apparatus and for tying, anchoring, and supporting electrical components that need high-strength, non-conducting materials. It's non-magnetic; has ultimate and yield strengths of 140,000 psi., non-inductive, dielectric strength of well over 400 volt/mil. Non-glass cross fibers minimize longitudinal splitting. This Class B material can be used at higher temperatures for short periods. *Westinghouse Electric Corp.* (Circle 474).

476—Submerged Arc Welding Flux is for single and multiple pass work at currents up to 1200 amp. Autoflux H-400 can sustain high travel speed with an x-ray quality deposit. Comes in 80-lb. bags or drums. *Hobart Brothers Co.*

477—Polyethylene Coating Resin, called Petrothene 205-15, provides greaseproofing with an unusually low coating weight. And its efficient coating characteristics extend to cellophane and foil. *U. S. Industrial Chemicals Co.*

478—Screw Machine Stock offers more consistent and easier machining. Micro-Chip was developed after 1½ years of research and field testing, is said to extend cutting tool life, give cleaner surface. *Kaiser Aluminum & Chemical Corp.*

Latex Mortar Patches Floors

Specifically designed for patching and resurfacing both wooden and cement industrial floors, Dow Latex 560 consists of polymer particles dispersed in water. As water evaporates, particles coalesce and air dry. Company has proved the material for three years on its own floors. *The Dow Chemical Co.* (Circle 475).

Turn the page

NEW SIOUX air slugger

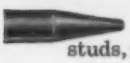
DOES 101 JOBS
IN HALF THE TIME!

METAL WORKERS KIT NO. 270C

METAL CUTTER—
CUTS METAL SMOOTH & FAST!
—moves accurately and cleanly through sheet metal with excellent maneuverability and on any cutting radius.

CHISEL—**SHEARS BOLTS, SPLITS NUTS,** pulls pins, breaks spot welds.

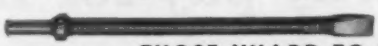
RIVET BUSTER—**SHEARS ALL TYPES OF RIVETS**



PUNCH—**PUNCHES OUT PINS, BOLTS,** studs, rivets, bearing races, and pressed bearings.

SHEET METAL PUNCH—**PUNCHES PERFECT HOLES FOR METAL SCREWS**—A precision made sheet metal punch that will punch perfect holes for metal screws faster than you can put them in place.

SCRAPER—**SCRAPES AWAY RUBBER COATING,** insulation or almost anything without damage to metal.

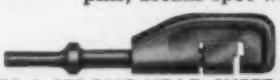


EXTENSION CHISEL

GETS AT THOSE "HARD TO REACH" PLACES and shears bolts, rivets, pins, breaks spot welds.

SPOT WELD BREAKER

BREAKS SPOT WELDS QUICKLY, easily, inexpensively. A hardened tool that will take long, hard, punishing use.



CRIMPER—
MAKES A STRONG NEAT, SHEET METAL JOINT, means faster, neater, better work, and more profit.

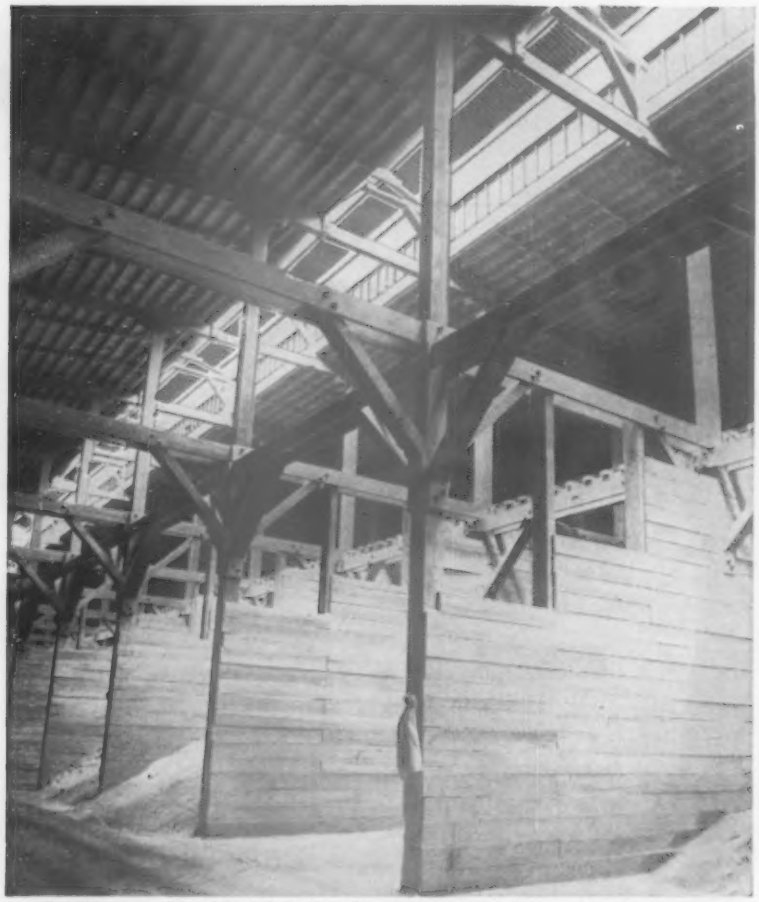
The SIOUX Air Slugger is one of the most useful of air tools. It will not create the hazard of fire or explosion and will save cost of torches and gas. Design features include a one piece barrel with no parts to get misaligned or wear out; and a cast iron handle that will survive the roughest treatment. It's light, sturdy, and SIOUX dependable.

Look for **SIOUX** *Tools in the yellow pages under "TOOLS, ELECTRIC"*

ALBERTSON & CO., INC.

SIOUX CITY, IOWA, U.S.A.

AIR IMPACT WRENCHES • AIR SCREWDRIVERS • ELECTRIC IMPACT WRENCHES • DRILLS • SCREWDRIVERS • GRINDERS • SANDERS • POLISHERS • FLEXIBLE SHAFTS • PORTABLE SAWS • VALVE GRINDING MACHINES • ABRASIVE DISCS.



F. S. Royster gets plenty of free light in this fertilizer warehouse through shatterproof skylights of Structoglas.

Sunshine is free... why pay for light?

You don't need lights during the day when your plant is skylighted with Structoglas fiberglass reinforced panels. Tinted and translucent, Structoglas lets in plenty of free sunshine—filters out glare.

Maintenance? Practically none; no painting needed. Structoglas is *shatterproof*, so there's no danger of breakage from vibration, impact, vandalism. And these acrylic-polyester panels keep that "like new appearance" for years in even the worst climates.

Structoglas is *easy to install* in skylights or sidewalls. Corrugated panels overlap roofing or siding, bolt into place without sash. Also available in flat panes for replacement of broken glass in sash.

structoglas®

WRITE TODAY for Industrial Case Histories and new Structoglas Glazing Folder (SL-1). Structoglas Inc., Dept. 503, Dover, Ohio.

UNCONDITIONALLY GUARANTEED FOR 3 YEARS

6001

FACTORY / MATERIALS NEWS

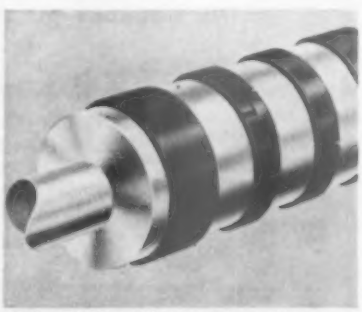
Begins on page 294

For more about these items, circle item numbers on Reader Service Card next to back cover.

479—Solid Film Lubricant, Poxylube 42, eliminates surface pre-treatment, can be applied to plastics, glass, or metals by spraying, dipping, or brushing. Although designed for use without curing, its solvent resistance and hardness can be increased by baking. *Poly Chem.*

480—Vegetable Parchment Paper insulating material for dry-type transformer coils offers efficient feed through automatic coil winding equipment, etched surface to prevent telescoping, high abrasion resistance, permanent wet strength. *Paterson Parchment Paper Co.*

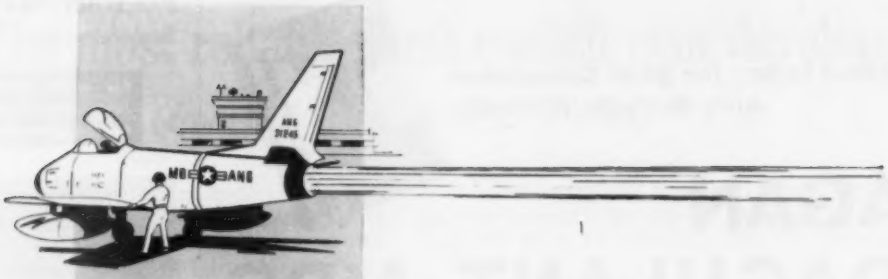
481—Pipe Covering Insulation of foamed plastic can be used from below zero to 220 F. It's ozone resistant and can be applied to sharp bends and elbows without danger of fissuring or cracking at the area under strain. Density is only 7 lb./cu. ft. *Armstrong Cork Co.*



482—Teflon Piston Rings, for nonlubricated service, seal reciprocating, oscillating, and rotary motion of cylindrical surfaces against leakage of liquids or gases. Carbon-filled Teflon is said to have lowest friction coefficient of any solid. *The Garlock Packing Co.*

483 — Magnetic Instrumentation Tape has a long-wearing coating that minimizes rub-off, reduces build-up of electrostatic charges, resists high temperatures. Two types, with 1.5- and 1.0-mil backing, have 0.45-mil black oxide coating. *Minnesota Mining & Mfg. Co.*

Turn the page



TAMES EARSPLITTING

SHRIEK

"QUIET-EAR" PROTECTOR

for optimum noise protection

Of unique new design, "Quiet-Ear" Protector uses neither bulky absorbing materials, nor excessively large sealing shells. Light in weight, highly efficient, sanitary, simple and inexpensive, the B&L "Quiet-Ear" Protector belongs wherever noise becomes a menace or a nuisance.

of jet engines, missiles, and other loud and injurious noises of military or industrial operations

Bausch & Lomb is proud to present the "Quiet-Ear" Protector, developed to meet an urgent need for more effective and comfortable ear protection required by personnel who work near loud noises. Such applications are wide: jet airfields and carrier flight decks, diesel engine generator houses, bio-acoustic testing laboratories, artillery or missile launching sites, steel rolling mills, punch press machinery, rock drilling, riveting and many others. For complete details, or more information on noise protection, write: Bausch & Lomb Optical Co., 90105 Lomb Park, Rochester 2, N. Y.

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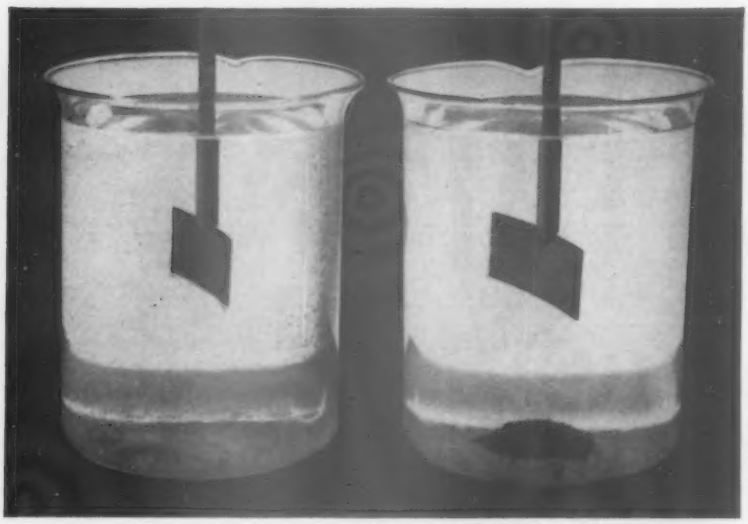
HAGAN COAGULANT AIDS

Faster coagulation . . . larger floc . . . increased throughput . . .



River water with Coagulants
Only 50% of floc settled in 3 minutes

River water with Coagulants plus Hagan Aid
99% of floc settled in 3 minutes

Scientifically formulated Hagan Coagulant Aids 2, 7, 11 and 18 are most effective means of improving coagulation in all types of clarification equipment, and are completely safe for drinking waters.

Supplied in free-flowing granular form, they are easy to use since they may be dry fed or readily prepared as slurries. While Aid No. 2 is a pure polyelectrolyte, Aids 7, 11 and 18 are intimate blends of: (1) polyelectrolyte to promote rapid floc growth and (2) processed clays to serve as nuclei around which floc forms readily. They also provide weight to increase the settling rate of the floc. One of the Hagan Coagulant Aids will meet your specific water condition.

In over three years of use in water clarification, Hagan Coagulant Aids have increased clarifier throughput rates, reduced floc carryover, simplified clarifier operation, improved color removal and even reduced overall chemical treatment costs in many plants.

We shall be glad to conduct coagulation studies to determine which of the several Hagan Coagulant Aids is best for your particular operation. For information, write:

HAGAN
CHEMICALS & CONTROLS, INC.
HAGAN CENTER, PITTSBURGH 30, PA.

HAGAN DIVISIONS: CALGON CO.-HALL LABORATORIES-BRUNER CORP.

FACTORY / MATERIALS NEWS

Begins on page 294

For more about these items, circle item numbers on Reader Service Card next to back cover.

484—Wound Wire Porous Metals are produced as cylinders, cones, and offer pore size control with ratings of 10 and 20 microns nominal and 25 and 50 microns absolute. Porostrand can be produced with dimensions up to 120 in. long and 48 in. in dia. *Bendix Aviation Corp.*

485—Flexible Tubing is for insulating bent piping or tubing where the use of rigid material is impractical. The lightweight, non-combustible Insutube is made up of a glass fiber insulation sandwiched between two braided asbestos tubes. *Union Asbestos & Rubber Co.*

486—Thermoplastic Resin contains over 59% fluorine by weight, which gives a high degree of stability. The polymer has high resistance to heat, light, chemicals; high mechanical strength and toughness; good thermal stability and impact resistance. *Pennsalt Chemicals Corp.*

487—Non-Woven Filter Material offers highly controlled porosity and extremely high capacity for stopping large quantities of minute particles. Currently used as part of a three-stage submicronic filter element for hydraulic systems. *Purolator Products, Inc.*

488—Silicone Rubber cures at room temperature, requires no catalyst premixing. Company emphasizes material's excellent adhesion to most clean surfaces including glass, metals, organic resins, or silicone rubber. It becomes tack-free within an hour. *Dow Corning Corp.*

Turn the page

New! The most reliable limit switch ever developed

(from Cutler-Hammer, of course)

Limit switch failures cause more production down time than any other electrical component. Suddenly this problem has been greatly reduced by Cutler-Hammer's new oiltight limit switch. Under test conditions so tough they'd never be equalled in actual service, it lasted far longer than any other limit switch.

It fits almost anywhere and in any position. A simple field adjustment changes switch operation to close the contacts by lever motion that is clockwise, counterclockwise, or both. And, no other switch is sealed more effectively. Even the silver-to-silver contacts are visible for quick inspection. Send for Pub. ED143-J211 now for full details.

WHAT'S NEW AT CUTLER-HAMMER?

We're planning ahead—with new, *better* products, like the limit switch. We've added plant capacity, new engineering talent and our new trademark symbolizes our new capabilities to help you plan ahead. Call the nearest Cutler-Hammer sales office or distributor to see how we can fit into your team.

WHAT'S NEW? ASK...

CUTLER-HAMMER

CONTROL

Cutler-Hammer Inc., Milwaukee, Wisconsin • Division: Airborne Instruments Laboratory • Subsidiary: Cutler-Hammer International, C. A. Associates: Canadian Cutler-Hammer, Ltd.; Cutler-Hammer Mexicana, S. A.

On production and maintenance work in manufacturing and service industries, Apex screwdriving tools have helped cut fastening costs for large and small companies alike. There's an Apex screwdriving tool to drive just about any kind and size of screw-type fastener . . . for use with any popular make of power or manual driver. All Apex Standard and Magnetic Screwdriving Tools are listed in Catalog 30-C; write, on your company letterhead please, for your copy.

APEX FASTENING TOOLS
SCREWDRIVING • NUT RUNNING • SPECIAL
The APEX Machine & Tool Co. • 1923 Dr. Patterson Blvd. • Dayton 2, Ohio

FACTORY / MATERIALS NEWS

Begins on page 294

For more about these items, circle item numbers on Reader Service Card next to back cover.

MATERIALS LITERATURE

489—Adhesives and Resins, their uses and physical properties, get detailed coverage in this 6-pager. Includes a temperature range chart for all the products. Also covers several laminating materials. *Narmco Resins & Coatings Co.*

490—Architectural Aluminum is described and illustrated in this 24-page booklet (File 15-J). Gives details on structural shapes, extruded tubing, window sills and pipe rails; also on plain, embossed, and colored sheet. *Reynolds Metals Co.*

491—Coating Systems for protective maintenance are matched with specific application problems in this 16-page brochure. Lists various materials that protect against corrosion, weather exposure, and chemical action. *The Glidden Co.*

492—Abrasives, Ceramics, and refractories are included in the 26 products described in this 8-page data folder. Some are available in commercial quantities, some in pilot plant lots, others in experimental batches. *The Carborundum Co.*

493—Non-Slip Abrasives and Alundum aggregates for safe, wear-resistant floors are presented in Catalog 1935-16 (8 pages). Shows use on walks, stairs, escalators, and ramps. Building specs. *Norton Co.*

494—Aluminum Alloys get detailed coverage in this 24-pager with information on aluminum sheet, plate, rod, bar, extrusion, and casting alloys. Booklet has finishes, patterns, and tempers available. *Olin-Mathieson Chemical Corp.*

495—Epoxy Resins and their applications are outlined in this 16-pager. Tells how-when-where to use these materials, gives several pages of engineering data. Emphasizes electrical equipment: stators, coils, etc. *John C. Dolph Co.*

Cadillac Gage gets tight production and labor control...reduces clerical costs by 30% with easy-to-use Automatic Keysort

NEED: fast, accurate management reports for controlling production of ultra-precision units—and a 226-man work force.

COMPANY: Cadillac Gage, leading manufacturer of electric-hydraulic servo valve assemblies for missiles and aircraft.

SOLUTION: the easy-to-use, low-cost machines and punched cards of Automatic Keysort Data Processing.

METHOD: Keysort punched cards, mechanically code-notched with required information for rapid sorting, are created as original documents for 1) material planning, 2) job-routing and 3) labor distribution. Upon completion of each job, the accounting department automatically processes the collected information with the Keysort Tabulating Punch—internally coding the cards with actual and estimated time of job. This unique machine then automatically produces a tabulation of variance in work time by work center and order number.

RESULT: with the comprehensive, on-time reports made possible by Automatic Keysort, Cadillac Gage is now able to pinpoint any job in the plant . . . can determine the cost of labor and the total time spent on each job by department and individual clock number. Knowing where they stand, management can act *at once* to correct a profit-losing situation. Best of all, it's done without specialized personnel. Without restrictive procedures. And at remarkably low cost.

For a detailed report on Automatic Keysort Data Processing at Cadillac Gage, call your nearby Royal McBee Data Processing Representative, or write Royal McBee Corporation, Data Processing Division, Port Chester, New York for Case History 977.

ROYAL McBEE · *data processing division*

NEW CONCEPTS IN PRACTICAL OFFICE AUTOMATION

For more facts Circle 838 on Reader Service Card

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UNITED Food Management Services, Incorporated is an organization of experienced specialists who will design, equip, staff, operate and supervise your company cafeteria, executive dining room, carry-out canteen, vending battery, or mobile canteen.

It is uniquely equipped by 40 years of experience in business, industrial and institutional food service to help you attract and hold desirable employees, build their morale and health, and achieve optimum productivity. Moreover, it is oriented to management's point of view on budgets, operating controls and financial reports.

UNITED serves nearly half a million customers every day in more than 250 installations. It can also bring *you* the most economical, efficient and appetizing food service available.

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FACTORY BOOKS

Inventory Forecasting for All

What makes this book an excellent choice for the plant's executive library is its organization for convenient reading. Almost every plant man can profit from some part, if not all, of *Statistical Forecasting for Inventory Control*. The book covers the total range of the subject, from the discussion of principles and methods to the development of mathematical concepts and formulas.

The author has arranged his material so the executive can read and gain information from the non-technical explanations of concepts that begin each section. Engineers and mathematicians can read farther into each chapter for details of the application of these concepts. Finally, the appendices cover the rigorous mathematical developments. Thus, everyone interested in inventory control can find in this book information that meets his individual needs.

Emphasis in the text is on the explanation of statistical techniques for better short-range forecasting of inventory requirements. New techniques include: use of servo theory concepts to control production fluctuations; linear programing in seasonal planning; scheduling devices; methods for short-run forecasting; and a basic stock concept for controlling production and distribution through several stages.

Techniques for measuring the uncertainty in a forecast are explained as a guide to the necessary and sufficient allowances for protective inventories. Direct measurements of the average and of the uncertainty are combined into effective ordering rules.

Included in the appendices is material on how to develop a simulation of a system to evaluate it, an analytical technique for studying the response of the system, and statistical methods for estimating in advance the impact of any control system on total costs, total inventories, and total services.

To sum up: Here's a sophisticated approach to a well-defined area of discussion, well written and cleverly organized into a highly readable, practical volume. It's a basic text on the subject. (Reviewed by Robert S. Rice.)

Statistical Forecasting for Inventory Control, by R. G. Brown. McGraw-Hill Book Co., 330 W. 42nd St., New York 36. 232 pages. $7.75.

Analyzing Incentives for Management

Here is a clearheaded approach to *Financial Incentives for Management*. It combines a lucid, analytical viewpoint with the details and specifics of a handbook. Calling on his 25 years of experience as executive and consultant—in both large and small companies—the author has come up with a book that will benefit any FACTORY reader. The first seven chapters are especially pointed for plant operations managers.

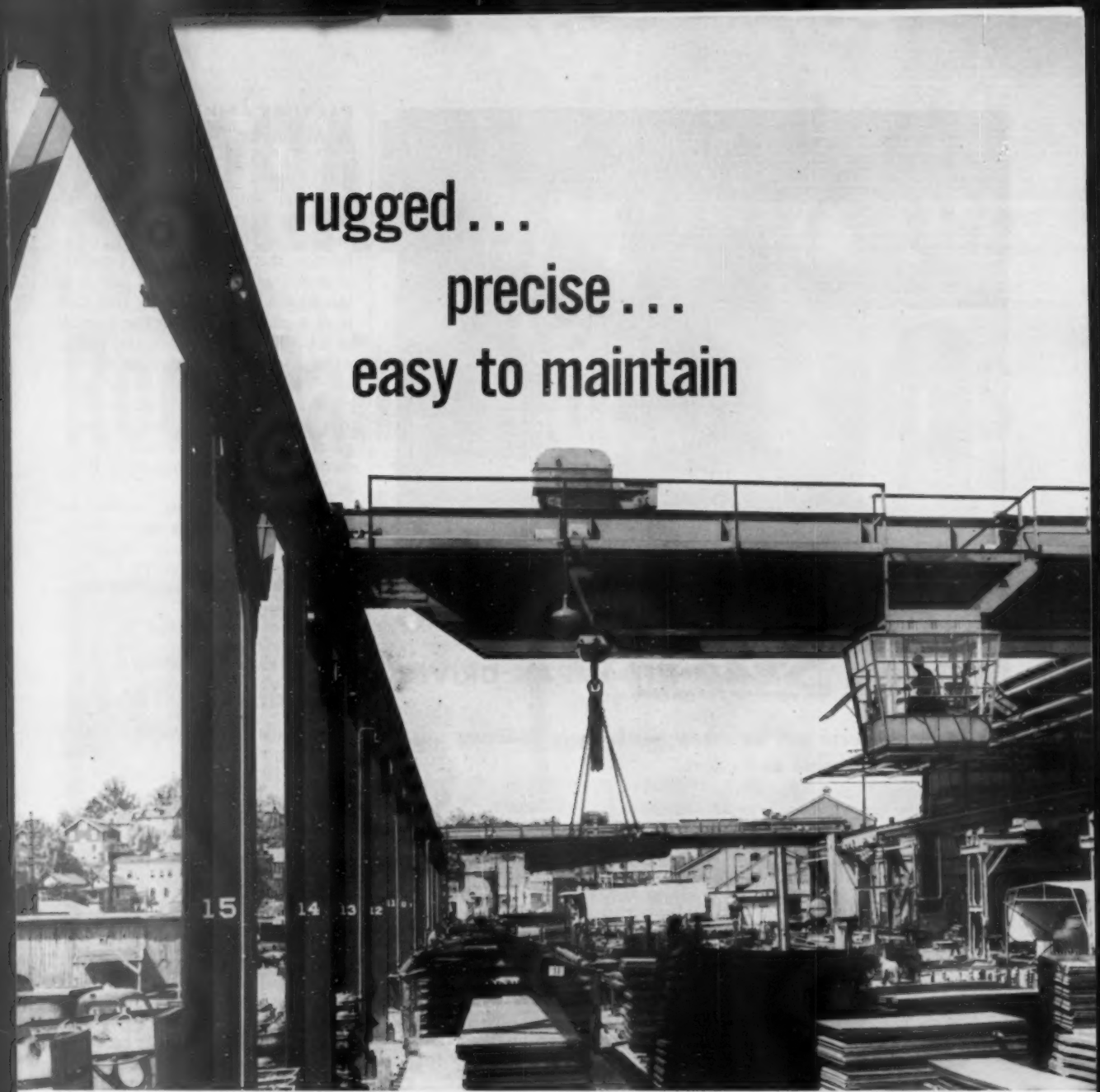
Straightforward and practical, the book covers the philosophy, objectives, and realistic applications of incentives for all levels of management. And it's doubly valuable for professional personnel or wage and salary administrators, since it collects in one place most of the pertinent knowledge about salary administration for executives. (Reviewed by L. R. Bittel.)

Financial Incentives for Management, by Richard C. Smyth. McGraw-Hill Book Co., 330 W. 42nd St., New York 36. 309 pages. $10.

Aid for Authors

One of the major problems that business managers face today is the deterioration of written communications. They'll find an assist in *Writing in Industry*, a book that resulted from the 1959 Conference on Writing and Publication in Industry, sponsored by the Polytechnic Institute of Brooklyn.

Speakers at this conference cov-



Westinghouse crane control

Precision built to crane-duty standards . . . long-term, low-cost service with easy operation and low maintenance costs . . . the most complete line of magnetic crane control available . . . 'round-the-clock service facilities in all areas . . . all components service-proved . . . undivided responsibility from one supplier . . . just several of the reasons why you can count on dependable, more economical service from cranes equipped with Westinghouse control. Your nearby Westinghouse salesman has all the cost-saving facts. Or, write Westinghouse Electric Corporation, P.O. Box 868, 3 Gateway Center, Pittsburgh 30, Pennsylvania. J-22145

Photo above shows material bay of main carshop of Norfolk and Western Railway in Roanoke, Virginia, in which operate two twenty-five ton Whiting cranes, equipped with Westinghouse Load-O-Matic* a-c control systems, handling heavy plate and other material for car-manufacturing operation. Westinghouse Load-O-Matic crane control is ideal for applications requiring unusual stamina, ease of operation and low maintenance cost. Provides smooth, stepless speed control without the cost and complexity of d-c conversion equipment. *Trade-Mark

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WATCH "WESTINGHOUSE LUCILLE BALL-DESI ARNAZ SHOWS" CBS TV ALTERNATE FRIDAYS

For more facts Circle 840 on Reader Service Card

ered such subjects as the editorial problems of an engineer-supervisor, the why and how of writing for publication, the techniques and practice of proposal writing. This last is a specialized kind of writing that can have a major impact on the success of a business, particularly one doing defense work. Also, many of a manager's written suggestions to the front office are proposals, pure and simple.

These speeches should be useful guides to anyone concerned with industrial writing. (Reviewed by Roger W. Christian.)

Writing in Industry, edited by Siegfried Mandel. Polytechnic Press, Polytechnic Institute of Brooklyn. (Distributed by Plenum Press, Inc., 227 W. 17th St., New York City.) 121 pages. $2.75.

A Look at the Organization Thief

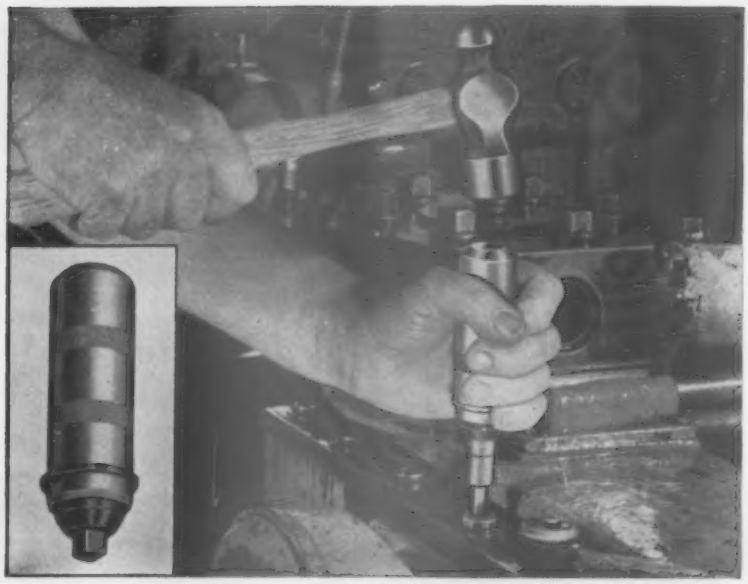
Who is the most successful robber of all? It's *The Thief in the White Collar*. Here is an analysis of his motives and methods—an authoritative discussion of a trouble management hestitates to talk about.

The text is exciting, informative, easy to read. The story is a sordid tragedy, nicely told. Two chapters at the start of the book give the statistics of white collar thefts and the psychology and sociology of the problem. The last two chapters offer a solution and a system of preventive management.

The bulk of the text is an excellent account of the kinds of chicanery that the author has experienced. Unfortunately, he has padded it with fillers from sources outside his experience—the stories of Serge Rubenstein, Harold G. Hoffman, others. All these are old hat to anyone who reads the newspapers.

Nevertheless, Mr. Jaspan's story and his concluding chapters should be required reading for anyone in management who thinks (about his own plant) that "it can't happen here." (Reviewed by M. F. Roberts.)

The Thief in the White Collar, by Norman Jaspan with Hillel Black. J. B. Lippincott Co., E. Washington Sq., Philadelphia. 254 pages. $4.95.



Break loose those tough, ornery ones with a Snap-on IMPAK DRIVER

★ **Protects bolt or screw heads from shearing off**
★ **Saves time and effort**

This new SNAP-ON Impak Driver is just the tool for breaking loose nuts and screws that are rusted or frozen tight.

It's simple and quick. Position socket or screwdriver bit on the nut or screw, give the Impak Driver handle a short twist to set the working cam and powerful return spring, then strike the tool head sharply with a hammer. This blow releases the spring and gives a tremendous twisting force to the blade or socket.

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Because of the sharp blow, there's less chance of screw or bolt head's twisting off when you use an Impak Driver. This not only saves time, but it means greater safety. A man pulling at a bolt can be thrown off balance if it suddenly shears off.

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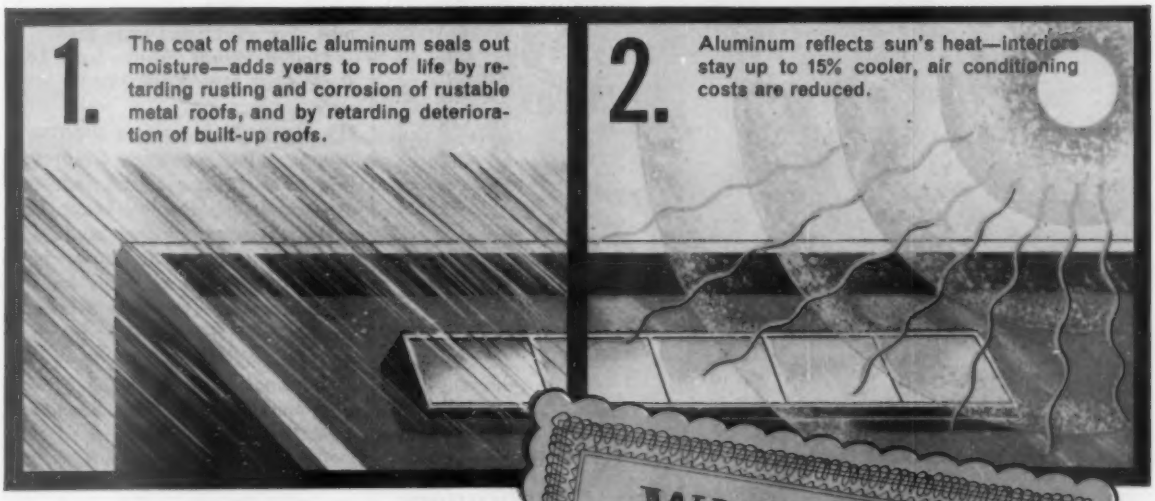
ASPHALT-ALUMINUM

Roof Paints and Coatings

...your best choice because:


1.
The coat of metallic aluminum seals out moisture—adds years to roof life by retarding rusting and corrosion of rustable metal roofs, and by retarding deterioration of built-up roofs.
2.
Aluminum reflects sun's heat—interiors stay up to 15% cooler, air conditioning costs are reduced.

WARRANTY
This Asphalt Aluminum Contains:
1. VOLATILE SOLVENTS
2. SOLIDS
3. ANALYSIS OF SOLIDS:
(a) STABLE ASPHALT COMPOUND
(b) FULL LEAFING ALUMINUM PIGMENT
NOT LESS THAN TWO POUNDS ALUMINUM METAL PIGMENT PER GALLON

This warranty assures you of 2 full pounds of pure aluminum pigment in every gallon of aluminum-asphalt roof coating

The Finest Paints Made with Aluminum are made with REYNOLDS ALUMINUM PIGMENT

Reynolds supplies pure aluminum pigment to leading manufacturers of asphalt-aluminum roof paints and coatings. For names of manufacturers, write *Reynolds Metals Company, P. O. Box 2346-PJ, Richmond 18, Virginia*

Watch Reynolds TV shows—"ALL STAR GOLF", "BOURBON STREET BEAT" and "ADVENTURES IN PARADISE"—ABC-TV

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for top reliability in critical industrial applications

Where maximum reliability is a must, protect your equipment by using RCA "Premium" Tubes. These premium-quality tubes are engineered and tested to the most exacting military and industrial standards...they're available from your RCA Industrial Tube Distributor.

Tight quality control in the selection of materials and parts plus stringent and continuous testing maintain the high quality and dependability of every RCA "Premium" Tube. You get more out of RCA "Premium" Tubes because RCA puts more into them.

PROTO-TYPE	"PREMIUM" TYPES
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2D21	5727 • 2D21-W • 5727/2D21-W
6AK5	5654 • 5654/6AK5-W • 5654/6AK5-W/6096
6AL5	5726 • 5726/6AL5-W • 5726/6AL5-W/6097 • 6663/6AL5
12AT7	6201 • 12AT7-WA • 6679/12AT7
12AU7	5814-A • 5814-WA • 6189/12AU7-WA • 6880/12AU7-A
12AX7	5751 • 5751-WA • 6681/12AX7

The table above lists the "Premium" types pictured above together with their prototypes. For a complete list of RCA "Premium" Tubes, get in touch with your RCA Industrial Tube Distributor. He'll give you immediate, off-the-shelf delivery of any types you may need.

RADIO CORPORATION OF AMERICA
Electron Tube Division — Harrison, N. J.

FACTORY FILMS

Operations Research, a practical introduction of the subject for management, is a non-technical guide on management technique. Aims, analytical tools, results, and limitations are examined in this three-part filmstrip series. A discussion guide is included. 3 filmstrips, color, sound, 52 min. Write to:

American Management Assn., 1515 Broadway, New York 36.

Atomic Power and the United States is the seventh in the "Atoms for Peace" series. Presents the current status of the nuclear energy program for production of electric power, and describes five types of nuclear reactors. 16mm, sound, 27 min. For purchase, write to:

United World Films, Inc., 1445 Park Ave., New York 29.

It's Up to You stresses the use of proper safety eyewear to prevent loss of sight caused by industrial eye accidents. Depicts many typical work situations that could lead to eye injuries, and shows types of safety eyewear available for specific working conditions. 16mm, sound, color, 11 min. For purchase or rent. Write to:

National Society for the Prevention of Blindness, 1790 Broadway, New York 19.

Old as the Hills tells the story of abrasion. It shows how mountain streams, the sea, and eroded hills taught the lesson of abrasion, and how deposits of natural abrasives provided the material for the first grinding needs—sharpening tools and polishing armor. Depicts the important role that abrasives play in the manufacture of almost every product. 16mm, sound, color. For loan, write to:

Norton Co., 1 New Bond St., Worcester 6, Mass.

Silver Threads Amass the Gold features production, semi-production, and maintenance-type threading machines. It demonstrates the threading of pipe, bolts, rods, and conduit. 16mm, color, sound, 25 min. For loan, write to:

The Oster Mfg. Co., 1340 East 289th St., Wickliffe, Ohio.

CAN COLOR CONDITIONING SAVE YOU MONEY?

You bet it can. To find out how, you might ask a specialist like Ed Dickinson. Ed's a Du Pont "Color Counsellor," one of more than 175 specially trained sales representatives whose job it is to help you put the power of color to work—profitably. But let Ed tell it himself:

"When it comes to maintenance painting, there are *2* ways you can save money. Naturally, your first consideration is quality. Believe me, there's no substitute for paints like Du Pont—tough, durable and right for the job. And to make sure they *are* right for the job, our recommendations are based on a thorough analysis of your particular maintenance problem.

"But that's only half the story when you specify Du Pont finishes. Equally important is what we call our Color Conditioning Plan. You see, research and experience have long demonstrated the power of color to affect people. Du Pont Color Conditioning puts that power to work for you. It's the scientific application of color to reduce accidents, cut down absenteeism, improve employee morale and boost efficiency. The result: an *extra bonus* of *savings*."

There's a man like Ed Dickinson in *your* area, ready to provide expert technical help in selecting the right colors and paints for you. To learn who he is, and to receive the 28-page booklet, "How to Put Color to Work," write: E. I. du Pont de Nemours and Co. (Inc.), Finishes Division, Dept. F-65, Wilmington 98, Delaware.

* * *

Completing his schooling in 1937, Edward Dickinson joined the Shipping Department of Du Pont's Birmingham, Ala., Paint Warehouse. An inquiring mind and a readiness to learn earned him several quick promotions and, in 1940, Ed moved up into sales. Since then, he's applied his talents to the solution of painting and maintenance problems for schools and institutions throughout North Carolina. Ed is married, and lives with his wife and children in Charlotte, N. C.

DU PONT COLOR CONDITIONING PAINTS

DU PONT

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BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

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FACTORY

CATALOG NEWS

For more about these items, circle numbers on Reader Service Card next to back cover.

For catalogs on plant site selection, see pages 202-06.

BUILDING

20—Plywood. All kinds of plywood data regarding anything from color to weather to chemical resistance are presented in two 8-page catalogs. No. GPX-HD3 covers high-density overlaid plywood. No. GPX-MD3 deals with medium-density plies. *Georgia Pacific Corp.*

21—Aluminum Sheet. Specifications, installation details, and suggestions for aluminum siding, roofing, flashing, and sandwich wall—all are found in Bulletin 71 (36 pages). Also, brilliant color samples are given in folder, Form No. 69. *Aluminum Co. of America.*

22—Roofing. Longspan roof decking of T-steel is described in Catalog No. 246 (16 pages). Catalog 241 (8 pages) illustrates steel roof deck with acoustical properties. For primed or galvanized steel deck, see Catalog No. 240 (16 pages). *Inland Steel Products Co.*

23—Flooring. This 24-page bulletin (MP-4d) lists features and illustrates construction details for "iron clad" concrete floors. Bulletin E-1d (18 pages) describes common grouting practices; gives recommended mixes, estimating tables. *The Master Builders Co.*

24—Overhead Doors. Small, medium, large doors, plus electrical operators and controls, are listed in this 20-page bulletin (No. CD-2432B). Includes specifications, instructions for opening preparations, other information for engineering selection. *Crawford Door Co.*

25—Wall Panels. Here's an 8-page catalog with data and installation details for Sanpan translucent walls, window wall units, and curtain wall inserts. Offers aid in selection, plus technical reports on light, heat, and sound transmission. *Panel Structures, Inc.*

26—Sandwich Wall. Handsome, helpful 16-page booklet ("The Sandwich Wall Story") gives examples, with costs, of several kinds of installations. Shows colors, plus diagrams of construction techniques. Guide for insulated wall selection. *Gregory Industries, Inc.*

27—Smokestacks. Abilities of Permaglas smokestacks to combat corrosive flue gases are demonstrated in this 8-page brochure, No. SS-202A. Shows applications, illustrates sections and accessories. Includes assembly and other diagrams. *A. O. Smith Corp.*

28—Expanded Metal. Two catalogs tell of expanded metal applications for products and for gratings and partitions. Both 4-pagers: First contains data on Safe-T-Mesh and Flattened type; second lists walkway, grating meshes, and stair treads. *Wheeling Corrugating Co.*

29—Rolling Doors. This well-illustrated, 36-page Bulletin No. 104 describes features of rolling service doors (steel or aluminum), fire doors, counter shutters, and rolling grilles. Provides comprehensive specifications and engineering data. *The Kinnear Mfg. Co.*

30—Automatic Doors. Catalog No. 171 (8 pages) lists folding, sliding, and combination models. Gives specifications for air and electric operation. Drawings illustrate installation. Catalog No. 260 (4 pages) shows same for cold storage doors. *Clark Door Co., Inc.*

31—Industrial Doors. Information on elevator doors, dumbwaiters, conveyor doors, and pass windows is listed in Catalog No. 16c/Pe (10 pages). Describes fully all features. Specifications are detailed, and drawings for installation are provided. *The Peelle Co.*

32—Fire Doors. Catalog No. 13c/Ri (24 pages) provides data on metal-clad and hollow-metal doors, Kalamein doors and frames, unit steel frames, hardware. Includes door designs, dimensions, details, limitations, and specifications. *The Richmond Fireproof Door Co.*

33—Sub-Flooring. Cellular subflooring with electrical raceways provides every square foot of your plant floor surface with electrical outlets. This safeguard against electrical obsolescence is described in detail in Catalog No. M-60 (M-Floors.) *The R. C. Mahon Co.*

34—Movable Partitions. Four-color catalog (No. 22a/Vi, 16 pages) portrays benefits from colored, movable wall partitions. Shows economy of partitions for individual offices and as large area dividers. Also railings and accessories. *Virginia Metal Products, Inc.*

35—Plumbing. This 12-page booklet (No. L20) describes how openings can be designed into precast concrete floors during construction. Details cover hand-cutting or drilling after flooring is in place, plus examples of framed openings. *The Flexicore Co., Inc.*

Turn the page

OTHER CATALOGS

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Material Handling ..... p. 400

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GENERAL ELECTRIC

Developed Exclusively for Tri-Clad* '55' Motors

NEW THERMO-TEC FOR SYSTEM POSITIVELY

ELIMINATES OVERLOAD BURNOUT

Allows Maximum Motor Output -- Safely!

Now—Tri-Clad '55' motors have simple, direct-acting thermal protectors that *positively* end winding failures from overloads!

New Thermo-Tector heat-sensing switches buried in stator windings react *instantly* to prevent heat damage. Unique Thermo-Tector "anticipation" feature varies motor shutoff point according to rate of winding heat rise. This ends need for operating safety margin.

Thermo-Tector system uses no costly amplifying relays or special circuitry, works with any General Electric motor controller.

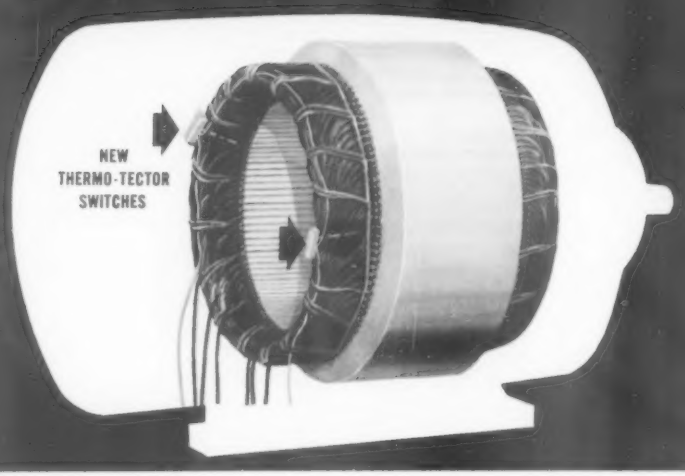
*Registered trademark of General Electric Co.

TURN PAGE FOR FURTHER INFORMATION

NOW!

GET MAXIMUM MOTOR OUTPUT WITH NO DANGER OF OVERLOAD BURNOUT!

New THERMO-TECTOR System
Operates IN THE STATOR . . .
Protects Under All Conditions!



You get *full output* from Tri-Clad '55' motors with Thermo-Tector protection. No operating "safety margin" is necessary since Thermo-Tector switches react instantly to prevent damage from *any* type of winding overload. New General Electric Thermo-Tector switches—buried deeply in the coils of the Tri-Clad '55' motor—are so durable they handle size 4 contactor coil current with *no costly amplifying relays* or special circuitry. Any conventional G-E motor controller works with the Thermo-Tector system.

Thermo-Tector protection is available on *all* Tri-Clad '55' motors in frames 254U-445U. For more information, contact your G-E Apparatus Sales Office or write for Bulletin GEA-7092, Section 866-2, Schenectady 5, N. Y.

SMALL AC MOTOR & GENERATOR DEPARTMENT

GENERAL ELECTRIC

36—Steel Buildings. Colorful, illustrated Catalog No. B-2059 devotes 16 pages to examples of pre-engineered buildings. Includes specifications. Shows features of ceilings, partitions, canopies, overhangs, windows, doors, louvers, and ventilators. *Armco Steel Corp.*

37—Spray Painting. Two 16-page catalogs describe Ransburg No. 2 Process for hand gun and for automatic sprays. Both have examples of products handled, plus a run-down on how the process operates, utility needs, and maintenance. *Ransburg Electro-Coating Corp.*

38—Wood Block Flooring. Simplified 8-pager (No. 5f/Je) summarizes main properties of materials. Includes details on preparation of concrete sub-floors, instructions for laying blocks and filling. *The Jennison-Wright Corp.*

39—Steel Grating. All kinds of custom-fabricated steel gratings and stair treads are discussed in this 14-page brochure, "A Picture Story of Kerrigan." Includes standard table of safe loads for steel grating and general engineering data. *Kerrigan Iron Works Co.*

40—Sidewall Panels. This 10-page Catalog No. K-129 describes steel sidewall panels for industrial buildings. Contains specifications, erection information, and drawings. Includes insert describing Truscon insulated steel sidewall panels. *Republic Steel Corp.*

41—Industrial Buildings. Specially designed buildings for industrial use are presented in Catalog No. 1 (8 pages). Features high, wide bays for all types of wall and roof construction. Examples of bow-string, mill, and flat-roof type buildings. *Dresser-Ideco Co.*

42—Custom Buildings. This 32-page brochure features three types of custom-built industrial buildings. First type is designed, engineered, built by firm; second is constructed of concrete tilt-up panels; third is built to customer specification. *Abell-Howe Co.*

43—Plant Security. Documents cost-savings by professional plant security force. This 16-pager thumbnails prevention of in-plant thefts, property damage, enforcement of company rules, management of traffic. *Pinkerton's National Detective Agency.*

44—Shop Benches. Two revised catalogs: No. 2103 (12 pages) describes broad range of standard-type work benches. No. 2104 (12 pages) shows cabinet-type shop benches, and lists parts and accessories such as electrical outlet panels. *Standard Pressed Steel Co.*

45—Office Furniture. Here's a packet of brochures on filing cabinets, desks, chairs, etc. Catalog No. 800 (12 pages) describes correlated office furniture. Catalogs No. 374A (8 pages) and No. 378 (4 pages) list file cabinets. *Corry-Jamestown Corp.*

46—Construction Fasteners. This 12-pager describes the Townsend Construction Fastening Systems for roofing, siding, curtain walls. Shows fastening materials, equipment, and procedures for metal and asbestos sheeting. *Townsend Co.*

47—Noise Abatement. Catalog AC-35A (28 pages) is packed with valuable ceiling panel information for engineers and specifiers. Contains construction diagrams, sound-control selection chart, and data tables for a variety of sound-absorbing materials. *Johns-Manville.*

48—Cable Trays. Basket- and ladder-type trays for supporting cables, wiring, and tubing are shown in 28-page catalog (No. 5912). Gives data on load capacity, sizes, fittings, and accessories for this equipment. Load charts are especially helpful. *The Globe Co.*

49—Steel Shelving. Two 8-page catalogs describe steel shelving for shop. No. B-20 lists open- and closed-angle types. No. B-40 lists company's "T" line of boltless shelving. Both include specifications, assembly instructions, and photos. *Alan Wood Steel Co.*

50—Fastening Systems. Need a powder-actuated system for setting steel to steel, studs to concrete, wood to steel, wood to concrete, steel to concrete, or studs to steel? It's all detailed with specifications in 12-page Catalog B-141. *Olin Mathieson Chemical Corp.*

51—Industrial Doors. Doors and door operators are described in these two booklets. Catalog No. A-410 (12 pages) lists steel frame doors, galvanized sheathed, wood, and aluminum types. No. 200 (8 pages) covers electric door operators. *Richards-Wilcox Mfg. Co.*

52—Roofing and Siding. Clearly spelled-out specification details for complete line of roofing and siding products are given in Catalog No. SR-1-60 (20 pages). Lists shingles, roll roofing, built-up surfaces, sheathings. Also asphalt coatings and plastics. *Flintkote.*

53—Formed Steel Sheet. Catalog No. 683 (6 pages) discusses high-strength sheet for concrete floor and roof construction. "Slabform" is a permanent form for poured concrete. Highlights characteristics; contains useful details on installation. *Bethlehem Steel Co.*

PRODUCTION

54—Portable Drills. Catalog A-1364 (6 pages) describes company's 1960 electric drill line. Covers heavy- and standard-duty, pistol-grip and D-handle drills. Table of comparative specifications aids selection. Shows conversion fixtures. *Porter-Cable Machine Co.*

55—Lock Roller. Electric tool for rolling Pittsburgh lock seams in sheet metal fabrication is described in 4-page brochure (E-2LL). Photos illustrate method of use, compare rolling with hammer method. Specifications include interchangeable slides. *Miller Falls Co.*

56—Electric Portable Tools. Catalog 1(G) (72 pages) lists complete line of electric tools, attachments, and accessories. Includes belt sand-

ACCURATE AUTOMATIC FEEDING

from ounces to tons per hour

ERIEZ

HI-VI

VIBRATORY FEEDERS

Only feeders with totally enclosed drive element as standard construction. A-C operated, electro-permanent magnetic drive

Continuous, uniform flow of feed of all sizes and shapes of bulk materials for blending, mixing, sorting, cooling, etc. Variable feed rate. Completely automatic, extremely accurate. Increases production, provides quality control, reduces maintenance and operating costs.

Fully enclosed drive element (standard—no extra cost) makes units dust and moisture resistant; ideal for sanitary applications. Break-resistant glass fiber springs • New patented magnetic drive provides greater feeding capacity than comparable size units • No rectifier needed • Simple installation • Factory pre-tested • Fully proved in plants everywhere

NOW AVAILABLE! . . . economical, specially constructed units for hazardous dusty locations . . . fully acceptable by Mill Mutual.

WRITE FOR FREE COMPREHENSIVE LITERATURE
Eriez Mfg. Co., 70-EB Magnet Drive, Erie, Pa.

ERIEZ

312 **Circle 845 on Reader Service Card**

FACTORY / CATALOG NEWS

Begins on page 308

For more about these items, circle item numbers on Reader Service Card next to back cover.

ers, bench grinders, portable buffers, vacuum cleaners, drills, screwdrivers, and many others. *The Black & Decker Mfg. Co.*

57—Work Gloves. Many kinds of work gloves and molded handwear are described in Bulletins 1310-2 (8 pages) and 1315-1 (4 pages). Both bulletins feature chemical-resistance tables to guide your selection of gloves for work conditions. *Mine Safety Appliances Co.*

58—Safety Glasses. Eye-protection Bulletin S-9302 (14 pages) provides a chart for calculation of the cost of eye injury. It discusses average costs of injuries, protection costs, and presents data from several manufacturing companies. Photos and drawings. *American Optical Co.*

59—Message Displays. Posters and display fixtures to build employee interest in management objectives—quality, safety, etc.—are described in this Hi-Vision Program package. Includes sample two-month program and full-size posters. *Elliot Service Co., Inc.*

60—Communication System. Brochure 28 SB (20 pages) explains how a "stunt box" adds automatic flexibilty to Teletype equipment. Also shows how system is used in integrated data processing, production control, etc. *Teletype Corp.*

61—Photocopier. New photocopying machine is described in Folder 69-268 (6 pages). Also covered: Machine specifications, photocopy papers and developers, illustrated step-by-step operating procedure, and suggested uses. Makes color copies, too. *A. B. Dick Co.*

62—Inventory Control System. Four-step control system for inventories is explained in 4-page Catalog PP102. System is based on company's Visirecord forms and files. Brochure also presents 13-point checklist to compare inventory systems. *Visirecord, Inc.*

Turn the page

ERIEZ

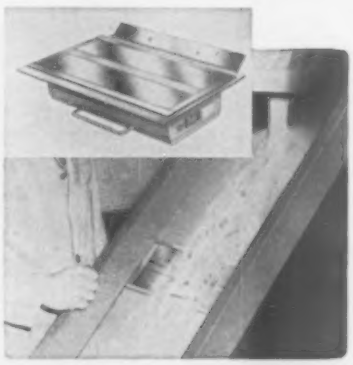
NEW SERIES 17

Erium-powered*

PLATE MAGNETS

Greatest magnetic strength per dollar ever offered!

New Construction and Design ...New Magnetic Power



Protect your machinery and production. Safeguard your product quality and reputation. Eriez Series 17 Plate Magnets can pay for themselves many times over in many ways.

All welded steel and stainless steel construction is standard on these all-new plate magnets in every model. They're more compact and rugged than previously available models . . . and designed to assure ease of installation in chutes, spouts, ducts, feed tables, and housings; and for suspension over screens, moving conveyors, etc. Wide mounting flange for better, easier dust-tight installation. Uniform dimensions for greater interchangeability.

Tops for performance because of their Erium-powered* magnetic circuit providing intense concentration of power in the most essential areas (three strengths available).

**Erium—an exclusive, high quality permanent magnetic power source specifically designed and energized by Eriez.*

Here's the finest, most versatile plate separator performance at the lowest dollar cost. Write today for complete data on Series 17 Plate Magnets to:

Eriez Mfg. Co., 70-EA Magnet Drive, Erie, Pa.

ERIEZ

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Popular 5040T now available with...

Detachable-TORQUE CONTROL BARS

make this a one-tool assembly line...

Size 5040TD
AIR IMPACTOOL
An I-R Exclusive

Ingersoll-Rand's reliable, job-proved, built-in torsion bar torque control Impactools have paved the way for these new *Detachable* torsion bars. The popular 5040T Impactool is also available as the 5040TD, an ideal tool where limited production does not warrant the cost of several Impactools with built-in torsion bars.

Here's the economical answer to better quality control on fastening jobs that require different torques for the various nuts or cap screws. Now you can have a series of detachable bars, preset to the specific torques you require.

For example: slip on the 40 ft. lb. bar and run those three nuts—slip it off—put on the 50 ft. lb. bar and run the six cap screws—next the 30 ft. lb. bar, and so on. The Impactool shuts off automatically at each preset torque—quality control at its best.

How do you get it? Order a new Size 5040TD Impactool which has the built-in automatic shut-off device that is actuated by the preset torque control torsion bar. Then order as many torsion bars as you need. You can set the torque yourself with a vise and a wrench.

The Heavy-Duty bar is adjustable from 45 to 90 ft. lbs. The Light bar provides torques from 20 to 50 ft. lbs.

Don't wait; phone or write today for a demonstration or a copy of Form 5298.

Ingersoll-Rand
11 Broadway, New York 4, N. Y.
Planned Annual Retooling increases output per man

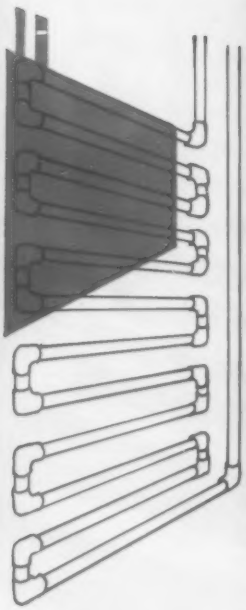
36A-8

NEW

MULTI-ZONE

PLATECOIL®

SAVES TANK SPACE

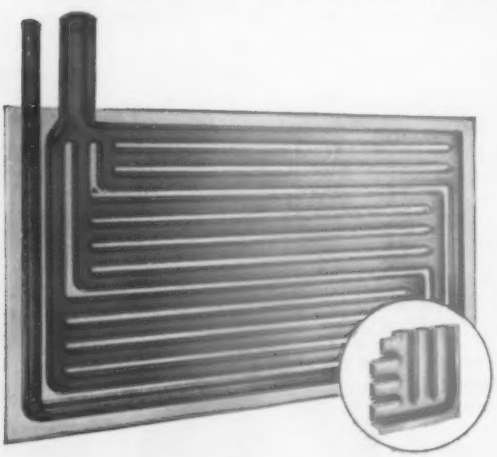


Operating Pressures up to 250 psi

Patented

Compact PLATECOIL units have replaced pipe coils in thousands of tank and process heating and cooling applications. High heat transfer per unit of surface and greater overall effective heat transfer surface permit the use of PLATECOIL which takes up less valuable tank space than pipe coils of equivalent capacity. In many cases this eliminates the need for additional tanks by increasing the capacity of existing tanks or processing vessels.

NOW – MORE TANK AND PROCESS EFFICIENCY THROUGH FASTER START-UP: LESS DOWNTIME



High heat transfer per square foot of surface and greater effective surface through better steam distribution produce a reserve heating capacity in the new MULTI-ZONE PLATECOIL. This reserve capacity delivers amazing heat transfer under overload conditions during tank and process "start-up" periods. "Downtime" is cut and the same heating capacity provides fast recovery of desired temperatures after introduction of "cold" work loads to preserve overall processing efficiency.

In addition to performance advantages, PLATECOIL presents substantial cost advantages. PLATECOIL is lightweight and easy to install. Streamlined PLATECOIL surfaces do not tend to collect deposits as do pipe coils and cleaning is a simple, economical operation. All stainless steel and alloy PLATECOIL units affected by cold working are annealed and pickled after fabrication to return the metal to its original condition and thus eliminate the probability of corrosion due to internal stresses and carbide precipitation.

PLATECOIL is available in standard styles, sizes and materials to fit a wide variety of applications. A complete line of accessories to facilitate engineering and installation adds to PLATECOIL versatility. Special PLATECOIL can be factory-fabricated to special needs.

Send for Bulletin P60 for complete data.

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LANSING 9, MICHIGAN

PLATECOIL® DIVISION

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FACTORY / CATALOG NEWS

Begins on page 308

For more about these items, circle item numbers on Reader Service Card next to back cover.

63—Quality Control. Manual E20-0015 (40 pages) explains systems and procedures, using company's punched-card equipment, for several facets of quality control. Flow charts, sample cards, and reports illustrate applications. *International Business Machines Corp.*

64—Silicone Rubber. Tables and charts in Folder 9-106 (6 pages) show properties of Silastic (silicone rubber) under a variety of exposures. Includes heat, cold, compression, weathering, moisture, oils, fuels, and chemicals. Shows typical uses. *Dow Corning Corp.*

65—Controlled Feeding. Catalog 941 (48 pages) describes and illustrates maker's variety of weighing, batching, and proportioning systems. Includes specifications and case studies. Table shows sizes and capacities of standard pan feeders. *The Jeffrey Mfg. Co.*

66—Stock Reels. This 4-page catalog describes and illustrates eight automatic and motor-driven stock reels for coil handling. Includes dimensions, capacities, specifications, and prices of all models. Descriptions include helpful application tips. *Durant Tool Co.*

67—Tracer Milling Machines. Two basic models of 2- and 3-dimensional hydraulic tracer-controlled millers are described in Bulletin 2771 (10 pages). Also tells about a new bedmill with hydraulic, electro-hydraulic, or numerical control. *George Gorton Machine Co.*

68—Plating Barrels. Bulletin PB-110 (20 pages) presents complete line of plating barrels. Includes single, double, and multiple cylinder models in wide range of sizes; lists contacts, pumping apparatus, etc. Diagram of typical layout. *Hanson-Van Winkle-Munning Co.*

69—Time Recorder. Payroll and job time recorders are described in this 4-pager. Lists 36 features of the Paymaster model—jam-proof;

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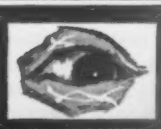

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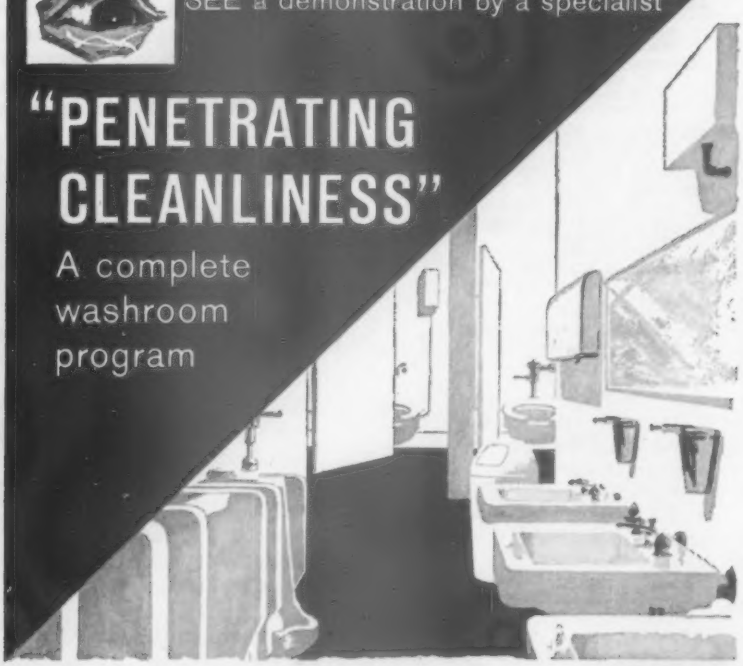

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Begins on page 308

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24-hour self-correction; automatic program control; direct subtraction calculation; streamlined case. *Cincinnati Time Recorder Co.*

70—Order Processing. Four booklets (12 to 16 pages each), Nos. SY-118, 119, 131, 134, explain and illustrate with flow charts the order processing systems, based on Moore business forms, in four manufacturing plants in different industries. *Moore Business Forms, Inc.*

71—Magnetic Pulleys. Typical applications of magnetic pulleys for removing tramp iron are described and illustrated in 6-page folder. Guide to selection of pulleys provides data for determining type and size. *Eriez Mfg. Co.*

72—Plastic Welding Gun. Here's a 4-page bulletin that describes features and use of Allen-Universal welding gun. It welds a variety of thermoplastic materials by the hot-gas (air) method. Brochure includes a price list of gun and accessories. *Esto Mfg. Co., Inc.*

73—Welding Equipment. Maker's complete line of eye- and face-protection equipment for welding is covered in this 28-page catalog (No. 36). Helpful list includes goggles, glasses, helmets, face shields, lenses, respirators, and similar items. *Sellstrom Mfg. Co.*

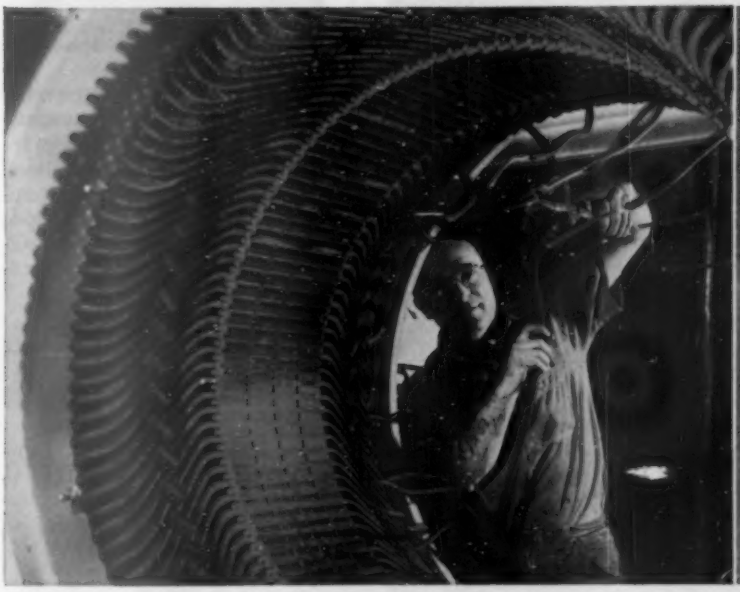
74—Welding Electrodes. This comprehensive 24-pager (EW-212) presents complete line of welding electrodes, gas welding rod, non-consumable electrodes, submerged arc welding flux, and automatic welding wire. Has application and operation data. *Hobart Brothers Co.*

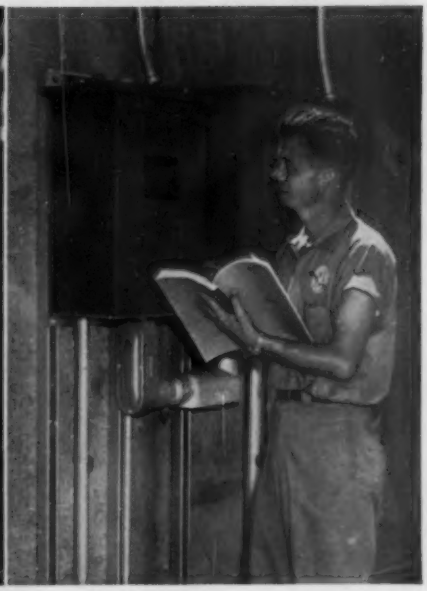
75—Blast Cleaning. Standard and heavy-duty Rotoblast barrels, from 1½ to 72 cu. ft., are described in Bulletins Nos. 705 and 706 (16 pages each). Includes explanations of special features, specifications, other data. Photos of applications of all sizes. *Pangborn Corp.*

Turn the page

SILICONE NEWS from Dow Corning

The Current Revolution





Silicone Insulated Equipment Brings Economy, Flexibility

Chances are you've heard of the current revolution in electrical equipment . . . of outdoor motors stripped of weatherproof housings . . . of motors that laugh at overloads . . . of smaller, lightweight transformers that put power right where you want it.

These developments typify three phases of today's growing trend toward electrical equipment that's more reliable and easier to install . . . less expensive initially and in the long run.

Phase I — Self-Protecting Insulation Cuts Motor Costs

Motors need no costly enclosures . . . even outdoors . . . when they've got self-protecting insulation systems. The insulation system itself, when made with Silastic®, the Dow Corning silicone rubber, shrugs off weather, humidity, corrosion . . . is no longer the "weak-link" to be coddled. Result: There's no need for the elaborate enclosures that push motor prices out of sight. Open motors do the job — costs are cut as much as 50%! Proof: One firm saved $28,000 on only three motors by specifying silicone insulated open motors rather than totally-enclosed fan-cooled units.

Phase II — Increased Service Factor Motors Reduce Power Costs

Motors with insulation systems that don't get "burned-up" when asked to carry overloads . . . that's one way of describing motors built with Dow Corning Silicones for extra service factor. When the going gets rough and production schedules are critical, they carry overloads of twenty-five to fifty percent beyond nominal rating . . . without distressing smoke signals. And though they deliver more horsepower when needed, they're still no bigger than their conventional counterparts . . . have the same nameplate horsepower rating. Result: You specify motors to match load, let silicones carry the overloads. No need for larger, more expensive motors just to handle occasional overloads . . . and you gain in reliability, too.

Phase III — Silicone Insulated Transformers Give Power Where You Want It . . . At Less Expense

New dry-type transformers insulated with silicones contain no toxic or flammable liquids. They're smaller, lighter . . . don't require expensive vaults or barriers. Result: Silicone insulated transformers are easier to handle, easier to install, can be located right at load or load center, need almost no maintenance. They save on costly low-voltage cable, too. You get greater flexibility of the distribution system and cut costs at the same time.

KEEP PACE WITH THE BIG CHANGE

Send today for the booklet, "Specify Silicone Insulated Motors and Transformers and Save", and get the full story on the current revolution in electrical equipment. Address Dept. 5105.

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GO-GETTER CUTS COSTS IN HALF; MAKES JOB SAFER

A leading chemical plant faced with the double explosion hazard of ethylbenzene fumes and aluminum chloride dust, solved its material handling problems – and saved money in the process – through the use of Revolvator's new fork lift trucks labeled Type Ex by Underwriters' Laboratories for Class 1 Group D explosion hazardous areas.

Previously, two men with a hand truck were required for this operation. Since the introduction of the Explosion Proof Go-Getter, one operator easily charges the hoppers in a safe manner with a minimum effort. "What used to be a dangerous, disagreeable job has now become a simple task," says the plant manager.

The explosion proof Go-Getter, available in 12 standard models, is but the latest development in Revolvator's better than a half century of experience in materials handling equipment covering standard walkie lift trucks, hand lift trucks, portable elevators and related equipment.

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SINCE 1904

FACTORY / CATALOG NEWS

Begins on page 308

For more about these items, circle item numbers on Reader Service Card next to back cover.

76—Automation Tools. Air-powered 21K and 21L tools for automatic drilling, tapping, and fastening are discussed in new 8-page brochure. Tools are linear motion plus rotation type. Engineering data include capacity and selection tables, available accessories, and the like. *Buckeye Tools Corp.*

78—Set Screwdriver. Use of SPS Setomatic to insert and drive set screws automatically is explained and illustrated in revised Bulletin 2302 (4 pages). Useful table compares typical costs of manual, powered, and automatic methods. Photos show how Setomatic operates. *Standard Pressed Steel Co.*

79— Fasteners. Plasti-Grommets is the name of a new line of standard fastening devices for assembly. They're self-retaining blind screw receptacles made of moisture-conditioned nylon. Booklet AF-6 (8 pages) describes features and uses. *Illinois Tool Works.*

80—Reactors. Bulletin 988 (12 pages) discusses features of Glasteel reactors for chemical processes. Used with all acids, except hydrofluoric, up to 350 F. and with most alkalies at moderate temperatures. Gives specifications of standard series. *The Pfaudler Co.*

81—Coolant Clarifier. Model 115 coolant clarifier uses centrifugal force to remove non-magnetic as well as magnetic particles from metal finishing coolants. Bulletin CC.113 (4 pages) provides specifications and shows test results. *The De Laval Separator Co.*

82—Flash-Butt Welding. Bulletin 7-913 (16 pages) describes in detail resistance flash-butt welding process, types of clamping, and flash and upset mechanisms. Illustrates 40 applications of butt-welders in making variety of products. *The Taylor-Winfield Corp.*

Turn the page

LASTING CURE FOR CHRONICALLY FAILING FLOORS

Resurfacing compounds based on THIOKOL liquid polymers bond to concrete, wood, metal . . . stand up to heavy traffic, exposure to chemicals, oils, solvents, water and wide temperature variations—for years!

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Concrete worn to bedrock by corrosive drippings, traffic.
After
Floor resurfaced with material based on THIOKOL LP stays flawless for years.

Scores of industrial firms to whom floor maintenance has presented a major perennial problem have found that resurfacing with compounds based on THIOKOL liquid polymers and epoxy resins results in long, trouble-free service—under severest conditions.

THIOKOL liquid polymers, a unique form of synthetic rubber, impart to floor overlays *a bonding action* that's virtually unbreakable even when material is feather-edged . . . *a resiliency* that takes relentless pounding, vibration, temperature extremes . . . *a resistance to solvents* that shrugs off corrosive elements.

These compounds apply by trowel, provide a smooth or skidproof surface, are ready for heavy traffic in as little as 24 hours, last for years.

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Since there is no one ingredient that has inherent resistance to all of these factors, the insulation or jacket of the portable cable or cord must be a combination of ingredients.

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Proof of the worth of Simplex Balanced Compounding can be found in the fact that Tirex portable cables have been successfully performing under the most rugged operating conditions for periods ranging up to twenty years.

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FACTORY / CATALOG NEWS

Begins on page 308

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83—Ram Benders. Here's a new 16-page catalog that tells about ram benders for forming iron pipe and channels and bars of steel, copper, brass, stainless steel, Monel metal. Includes range of benders for ½-in. OD tube to 16-in. OD pipe. *Wallace Supplies Mfg. Co.*

MECHANICAL

84—Roller Bearings. Bulletin No. 114 (12 pages) describes cylindrical roller bearings with Super Finish rollers and raceways. Each of three series provides option of five variations. Tables give dimensions, load capacities. Photos. *Hoover Ball and Bearing Co.*

85—Indexing Components. Dial feeds, transfer machines, and high-speed precision indexing of production machinery are covered in 40-page Catalog No. 160. Includes design details; how to select drives; tables of ratings and dimensions. *Ferguson Machine Corp. of Ind.*

86—V-Belts. This 64-page bulletin (No. 2011) is entitled "BostRon V-Belts Pre-engineered Industrial Design Catalog." Contains general information and describes such features as heat and oil resistance, static conducting, low-moisture regain, and the like. Has selection tables. *American Biltrite Rubber Co.*

87—Speed Reducers. Here's a 20-page catalog that discusses and illustrates shaft-mounted reducers. Includes construction, drive selection, and installation details; service classifications. Shows accessories and power-transmission equipment. *The American Pulley Co.*

88—Chains and Sprockets. Book No. 2757 (44 pages) covers more than 2000 types and sizes of stock roller chains and sprockets. Tables give sizes of single, double, triple, and quadruple strand roller chains, other types. Data on flexible couplings. *Link-Belt Co.*

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FACTORY / CATALOG NEWS

Begins on page 308

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89—Flexible Couplings. Heat-treated alloy-high tensile couplings for uniform loads and high speeds are the subject of this 4-page folder. Includes tables of dimensions, standard keyseats, service factors, and rating capacity. Tells how to select the right sizes for your needs. *Van Gelder Mfg., Inc.*

90—Screw Conveyor Drives. Bulletin No. 7106 (20 pages) presents design features, motor mounting positions, and gives selection data for complete drives. Details of trough end dimensions, nominal sheave ratios. Also includes helpful information on other types of drives. *The Falk Corp.*

91—V-Belt Drives. Design and selection data for multiple V-belt drives are set forth in Manual No. 162 (68 pages). Tells how to assure trouble-free operation and maximum belt life, and lists causes of premature failure of V-belt drives. *United States Rubber Co.*

92—Instrument Gears. Bulletin tells how you can buy gears, pinions, and racks graded for quality, material, price. Four grades come in five materials—stress proof, machine, stainless steels; brass; aluminum. Contains other useful data on this line. *Franke Gear Works.*

93—Power Transmission Belting. Catalog B-60 (24 pages) presents advantages of company's positive drive and variable speed belts. Explains such features as adaptability to shock loads, to long and short centers, high- and low-speed operation, etc. *Maurey Mfg. Corp.*

94—Speed Reducers. Modern methods of speed reduction with compact, shaft-mounted units are described in 64-page Bulletin A692. Torque Arm speed reducers are now built for capacities to 170 hp., with output speeds from 10 to 400 rpm. Photos. *Dodge Mfg. Corp.*

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For more facts Circle 856 on Reader Service Card

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- AND SPEED
- IN INDUSTRIAL
- DATA COLLECTION

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ERROR PREVENTION

- Correct number and combination of data cards and dials are required before transmission is possible.
- *Visual* verification of variable information before and after each transaction.
- Data dials reset *automatically* to zero, by card removal after each transmission.

ERROR DETECTION

- Automatic checking of pulse length and timing; message length and character composition. Automatic re-transmission is available.

SPEED

- Reading, transmission and recording at 60 characters per second.
- System speed is not affected by operator limitations.
- Queuing drastically reduced by requiring correct message composition *before* entering communications network.
- Central unit *simultaneously* accepts message and selects next transmitter. No lost time in switching.

VERSATILITY

- Accepts up to five prepunched card combinations . . . varying sizes . . . paper or plastic. Eliminates unwieldy master files.
- Permits variable messages—up to 150 characters in length.
- Input code can be converted to any communications system or computing code.
- Provides wide variety of time, date and shift codes, i.e., hour of year, M day code or any conventional mode.
- Plugboard flexibility throughout.
- Up to 36 input stations can be connected to one compiling station.
- Contains complete, fully-synchronized time system.
- Of fully modular construction —facilitates maintenance, allows virtually 100% availability factor.

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HELPS UNITED AIR LINES KEEP 'EM FLYING

Keeping fast jets in top condition and maintaining tight operating schedules call for maximum cleanliness in shops where planes are serviced. For complete cleaning dependability in heavy maintenance jobs as well as for delicate precision equipment, United Air Lines' Engineering and Maintenance Division at San Francisco uses "KEX" Industrial Towel Rental Service.

The aircraft, automotive, food processing, oil, and steel industries are only a segment sold on "KEX" Industrial Towel Rental Service. For over 30 years, "KEX" has served Industry large or small with the most efficient, effective and economical means of handling its wiping material requirements. "KEX" Rental Service is tailored to fit your plant operation.

"KEX" is a registered trademark of Callaway Mills Company, manufacturers of famous Label of Luxury towels, carpets, and scatter rugs—at fine stores everywhere. "KEX" Service is provided nation-wide by franchised local distributors. United Air Lines is supplied by Shop Towel Service & Supply, So. San Francisco, Calif. For further details, look under "Wiping Towels" in the Yellow Pages. Or write "KEX" National Service, 295 Fifth Avenue, New York 16, N. Y.

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FACTORY / CATALOG NEWS

Begins on page 308

For more about these items, circle item numbers on Reader Service Card next to back cover.

MAINTENANCE

95—Communicating System. Advantages of the 1100D intercom system are summarized in 4-page bulletin (Form 276F). Depicts three basic wiring plans for administrative and industrial use. Operating features include remote reply plus privacy protection. *Executone Inc.*

96—Water Coolers. Electric water coolers are presented in this 4-color, 14-page brochure (WC-6501). Includes "Wall Line" design for mounting on or off the floor; hot and cold models for coffee breaks; coolers for hazardous locations. *Westinghouse Electric Corp.*

97—Fire Protection. This 4-pager (FP958) describes a protection system for every type of fire hazard. Offers a choice of extinguishment or control methods, automatic detection, and central station supervisory service for sprinkler system. *Grinnell Co., Inc.*

98—Fiber Duct. This 4-page folder (No. 300) describes Sonoairduct, a round lightweight fiber duct for underfloor or overhead heating and cooling systems. Gives duct sizes, equivalent rectangular capacities. *Sonoco Products Co.*

99—Lubricants. Here are 8 pages of reasons why a silicone lubricant may solve your tough lubricating problems. Bulletin 6-101a discusses properties of silicone oils, greases, and factors contributing to longer lubricant life. Application photos. *Dow Corning Corp.*

100—Name Plates. All sorts of identification tags are described in 4-pager (No. 900). It offers stock or made-to-order plates. Shows engraved Bakelite and aluminum shapes; brass and plastic valve tags. *Seton Name Plate Co., Inc.*

101—Preventive Maintenance. Here's a 4-page catalog illustrating a proprietary maintenance control and scheduling system that is custom-

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PRODUCTS YOU NEED FROM
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Sold through leading distributors in All Principal Cities

FAIRBANKS PATENTED RENEWABLE SEAT RING BRONZE GATE VALVES

Fig. 1238 — 200# S.W.P — R.S. Gate Valve
Also available Fig. 1232 N.R.S Gate Valve

Now, without ever removing the valve body from the line, you replace the seat rings in a gate valve. In just 7 to 10 minutes you have the equal of a new gate valve back in service. No special tools or skills are needed. Just think of the savings in time and effort you get. This patented Renewable Seat Ring Bronze Gate Valve is just one of the typical values to be found in Fairbank's full line of bronze and iron body valves. Valves that are being specified and installed in an ever increasing number of the nation's newest, most modern buildings!

Sold through leading distributors in All Principal Cities

FAIRBANKS TWO-WHEEL AND PLATFORM HAND TRUCKS

Fig. 9215-S — General Purpose Truck

Studies have proven that on the basis of labor costs per ton handled, hand trucks are by far the most economical. There's a Fairbanks Two-Wheel and Platform Hand Truck to meet your every need and give you important time and cost savings. For, if you think of trucks as tools, then you recognize that the right truck must make lighter work of materials handling. With Fairbanks, proven by 70 years of dependable service, you get the right tool, the right truck, to do more with less effort and with greater safety.

WHEN you buy Fairbanks Valves or Trucks, Casters or Wheels, or the well known Dart Unions, you're buying more than a product. You're buying the Fairbanks reputation, built by giving real values and dependable performance for 70 years. This important *plus* does not show up in the price but always in the dependable, trouble-free performance of the product that bears the Fairbanks or Dart name.

Buy Through Distributors. Fairbanks products are stocked, sold and recommended by leading distributors in all the principal cities across the nation.

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No. 3 in a series of washroom survey comments from "SBS soap counselors"

We showed them how to clean - disinfect - sanitize - deodorize in one money-saving operation!

Edward T. McNamara, Jr.

SBS soap counselor, has helped many plants in the Southwest improve their wash-up and clean-up programs. Here's an excerpt from his account of a survey at a synthetic rubber plant:

"We found washroom housekeeping costs way up . . . for the usual reasons. Maintenance men were using slow-acting scrub soaps, scouring powder and disinfectants. These single-purpose products required lots of elbow grease and needless duplication of effort.

"Plant Management was pleasantly surprised when we showed them how easily a single product, new SBS 50 handles *ALL* of these washroom chores *in less than half the time!*" SBS 50 cleans - sanitizes - disinfects - deodorizes in *1 economical operation!* Just one swish of a mop or washcloth with SBS 50 cleans soils from walls, floors, fixtures — all the places where germs breed. No scrub, no rinse, no waste motion! SBS 50 is especially formulated to simplify industry's housekeeping chores. Its effective 4-way action reduces maintenance costs.

Money-saving suggestions like this *begin* with OPERATION PINPOINT–a thought-provoking presentation filled with facts about skin hygiene and washroom maintenance. The SBS soap counselor serving your area can pinpoint the right soap to do every skin cleansing job best and at lowest cost in your plant. Let him show you OPERATION PINPOINT . . . just call your nearest SBS office, collect.

the washword of industry

SBS sugar beet products co.

SAGINAW, MICH. • Los Angeles, Calif. • Newark, N. J.
CANADA: Chemical By-Products, Ltd., Toronto, Ontario

FACTORY / CATALOG NEWS

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designed to meet the needs of any size plant. Offers maximum recording speed and minimum clerical expense. *Visirecord, Inc.*

102—Steam Specialties. Catalog No. 69A (55 pages) presents wide selection of steam and air traps, strainers, separators, pressure regulators, block steel valves, engine stops. Dimension and capacity tables, selection data, parts list, photos. *Strong, Carlisle & Hammond.*

103—Hand Tools. Name the mechanical hand tool you want and it's probably listed in this 80-page catalog (No. 5628). Contains data on some 250 types of tools from adjustable wrenches to yarning irons. Well illustrated and indexed for quick reference. *Proto Tool Co.*

104—Cleaners. Blower-suction cleaning equipment is depicted in spiral-bound brochure. Includes portable and mobile types that convert quickly for blowing, air sweeping, spraying. Application photos show how to handle various clean-up problems. *Clements Mfg. Co.*

105—Airless Paint System. Advantages of airless spray system are discussed in 8-pager. Tells what it is and how it works in simple diagram of operating components. Explains airless process for maintenance and production. *Nordson Corp.*

106—Car Thawer. This 8-pager (59-123) shows how to solve thawing problems economically with infra-red heat. Useful for coal and other materials on three types of dumping installations—inverted car, hopper dumping with and without shake-out equipment. *Fostoria Corp.*

107—Floor Sweepers. Set of 4-page bulletins describes gas-powered or electric-powered floor cleaning equipment. No. 727 shows walkie type; No. 743, rider type; No. 741, scrub-and-dry type. All have specifications and performance data. *Clarke Floor Machine Co.*

Turn to page 332

AMERICAN-STANDARD INDUSTRIAL DIVISION AIR-LIFT IN ACTION

From American-Standard Industrial Division

AIR-LIFT† FOR INDUSTRIAL PLANTS

Air-Lift is a new concept of coordinated products and services from American-Standard Industrial Division. Its purpose: help you lift productivity and profitability of industrial plants through better control of inplant environment. Air-Lift offers one-source responsibility for heating, ventilating, air-conditioning equipment designed and manufactured to work together...with service by product specialists in every major city.

S.

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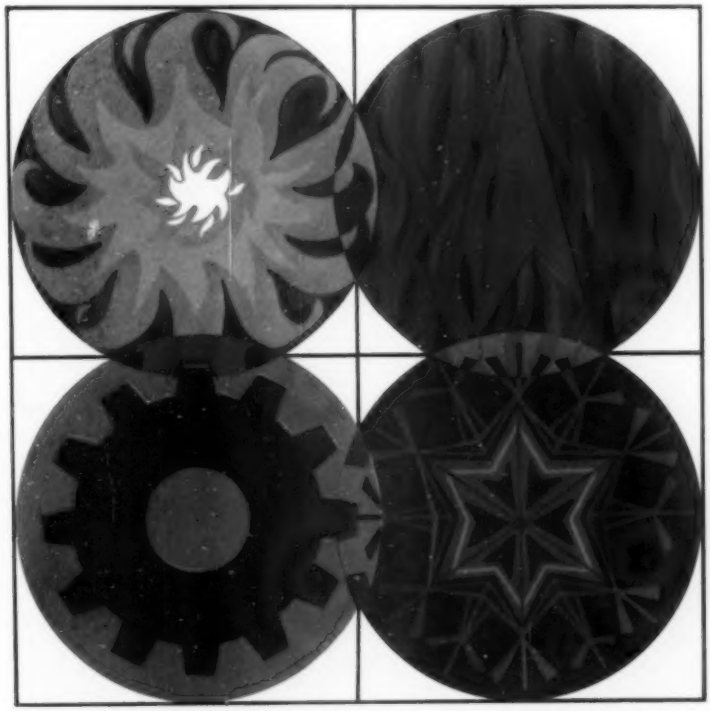

I.

D.

†Service-mark of American Radiator & Standard Sanitary Corporation

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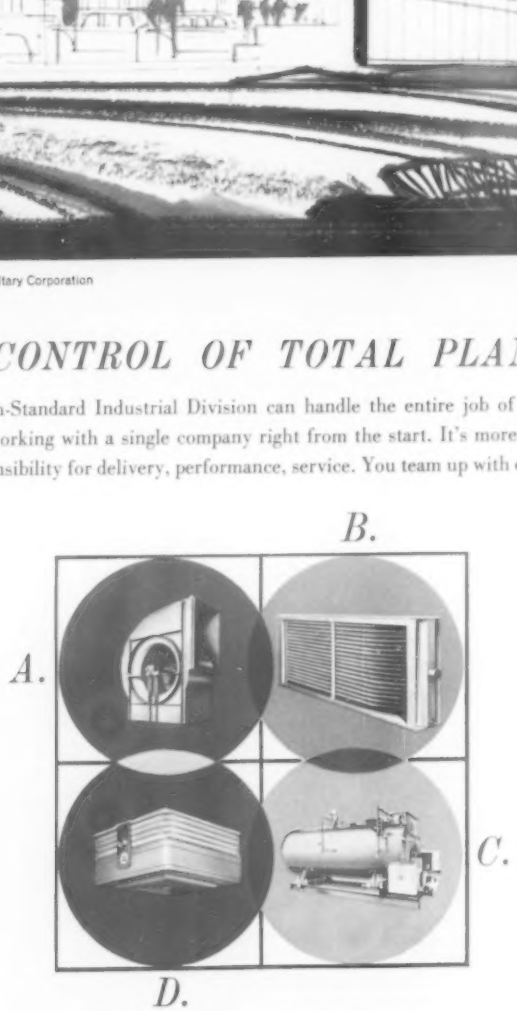
YEAR-ROUND CONTROL OF TOTAL PLANT ENVIRO

Whatever the plant size, American-Standard Industrial Division can handle the entire job of inplant environment co
And you gain in several ways by working with a single company right from the start. It's more convenient. Fewer inter
save your time. You pinpoint responsibility for delivery, performance, service. You team up with experienced product spec



AMERICAN-STANDARD INDUSTRIAL DIVISION MAKES A COMPLETE LINE OF EQUIPMENT FOR HEATING AND VENTILATING, INCLUDING: FANS (A), HEATING COILS (B), BOILERS (C), UNIT HEATERS (D).

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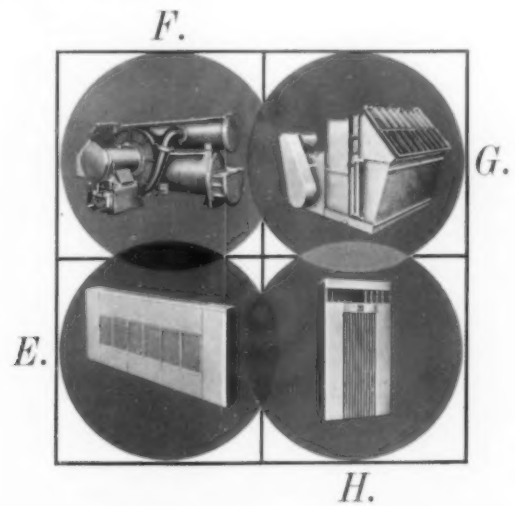
who can give you the latest developments on everything from fans and boilers to centrifugal refrigerating machines —and supply information on special equipment, too. And because the individual units are designed to work together, you're assured of an integrated system. Give your plant an Air-Lift . . . from American-Standard Industrial Division.



EQUIPMENT FOR AIR-CONDITIONING SYSTEMS FOR PLANTS OF ALL SIZES INCLUDE CENTRIFUGAL REFRIGERATING MACHINES (F), MULTI-ZONE (G), PACKAGED (H), AND INDUCTION (E) AIR CONDITIONERS.

ONE-SOURCE RESPONSIBILITY . . . the heart of American-Standard Industrial Division's Air-Lift Service. Now—with the combined American Blower, Ross Heat Exchanger, and Kewanee Boiler product lines—American-Standard* Industrial Division offers *all* the major components for complete, integrated systems to control inplant environment. You benefit by getting air-conditioning, air-handling, heating, and air-pollution-control equipment designed, engineered, and manufactured to work together. And you have one-source responsibility for its quality and performance. Offices in all principal cities are staffed by product specialists whose practical knowledge of equipment selection and application may prove most helpful to you. American-Standard Industrial Division, Detroit 32, Mich. In Canada: American-Standard Products (Canada) Ltd., Toronto, Ont. Export Division, American-Standard, New York City.

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INDUSTRIAL DIVISION

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Air conditioning — Centrifugal refrigerating machines Central station units • Fancoil units Self-contained air conditioners • Package water chillers • Multi-zone air conditioners • Sprayed coil dehumidifiers Heating and cooling coils • Air washers

Air handling — Industrial fans with wheel types for handling air, gases, materials, and shavings • Centrifugal, propeller, tubeaxial, and vaneaxial fans • Utility sets Power roof ventilators • Centrifugal compressors • Specialized fans, blowers

Heating — Firebox, scotch-type steel boilers and package units for heat, process steam Vertical, horizontal unit heaters for steam, hot water • Heavy-duty heating coils • Industrial unit heaters • Heating and ventilating units • Cabinet heaters

Air pollution control — Dust collectors and fly ash collectors for eliminating dust and recovering fly ash Cyclone-type centrifugal dust collectors Disposal systems • Tubular-type centrifugal collectors • Package units Electrostatic precipitators

Power transmission — Gyrol® Fluid Drives for stepless, adjustable-speed control of driven machinery Complete range of sizes, 1 hp thru 12,000 hp • All provide extremely smooth pickup of the load for maximum protection of motor and machine

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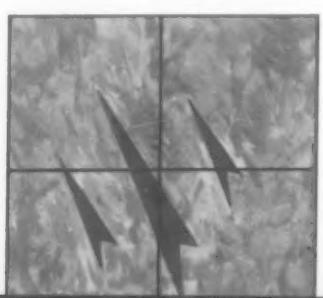


DOW | **WEED AND GRASS KILLERS**

WEEDS ARE A HAZARD YOU CAN'T AFFORD!

Spray them away with GARLON, the low-cost weed and grass killer

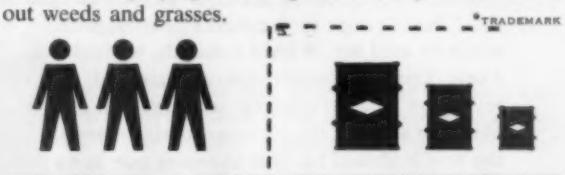
Weeds and grasses have taken over this siding, invading the switches, rusting the fences, creating a fire hazard. Under old-fashioned methods this would have meant weeks of work for an extra crew at prohibitive labor costs.

The modern, low-cost method–spray them away with Garlon*. And since Garlon can be applied anytime weeds are growing actively, you can do it at your convenience and spread your maintenance dollar over a longer period.

Garlon is easy to use, too. Simply add the required amount of water, mix, and you're ready to spray. Your own crews can do the job, or a professional contractor will do it very inexpensively. Spot re-treatment if needed, is just as easy and inexpensive.

It all adds up to lower-cost control of trouble areas like fences, sidings, storage areas, drainage ditches, parking lots. And the cost gets progressively lower! Once you start a program of chemical vegetation control, you'll find fewer sprayings are required each year to knock out weeds and grasses.

*TRADEMARK



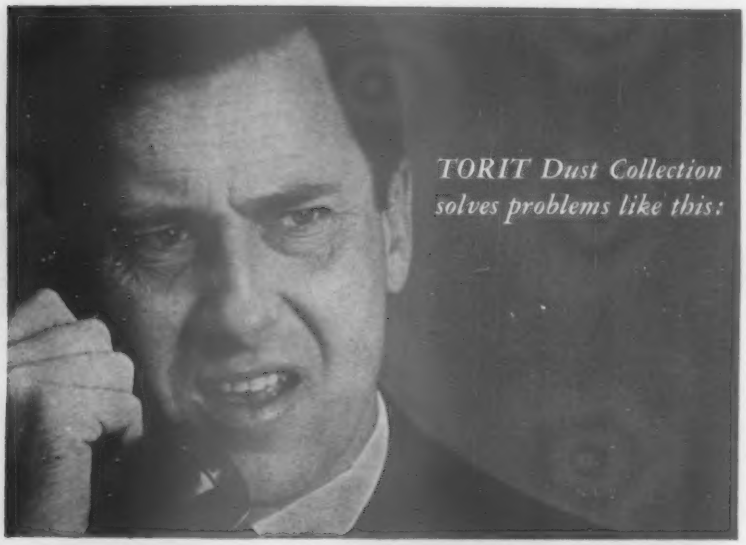
Hand-cutting costs stay constant from year to year

Chemical maintenance costs actually diminish each year

For more information on modern chemical vegetation control write: THE DOW CHEMICAL COMPANY, Agricultural Chemicals Sales Dept. 207LO5, Midland, Michigan.

See "The Dow Hour of Great Mysteries" on NBC-TV

THE DOW CHEMICAL COMPANY · MIDLAND, MICHIGAN



"6 MEN OUT AGAIN TODAY?" "WHY?"

"I was on the receiving end of that question. And I knew what the boss was driving at. Production-wise, we couldn't stand our current rate of absenteeism. Even the men on the job were dragging their feet. To show you what I mean: we had just lost one of our best customers. Reason: one too many late shipments.

"Logically, when sickness strikes, you consult a doctor. Which is what I did. Without actual examinations, he couldn't diagnose the trouble. But he did give me the clue when he asked, 'How are your working conditions?'.

"Frankly, our plant is dirty. Or better put, dusty. With grinding machines running 24 hours a day, how could it be anything else? With that thought, I remembered. A salesman had been in my office just the other day talking about dust. I had too many production headaches at the time to hear him out. But I kept his card. So I called him back.

"He was from Torit. He was selling Torit Dust Collectors . . . machines that trap dust. When I compared the low cost of his equipment with the high cost of our production lag, I decided it was worth a try. So I bought one . . . just one, to start, for $285.00. We installed it ourselves on a key machine.

"The change in the man operating that machine sold me. Within a month, we had a Torit Dust Collector system attached to seventeen dust-producing machines in the plant. As a result, the air in our plant is clean, the way it should be. Our absentee rate is no longer a problem. Our production rate is at top speed. And you know something? I feel better myself!"

Is dust doing you *dirt? For complete facts on dust damage . . . and how to control it . . . write:*

TORIT manufacturing company

Dept. 324, 1133 Rankin Street, St. Paul 16, Minnesota

FACTORY / CATALOG NEWS

Begins on page 308

For more about these items, circle item numbers on Reader Service Card next to back cover.

108—Pavement Sweepers. For cleaning big areas, here are four bulletins on powered sweepers to tell you how. No. 116 describes model 200 with 2-cu.-yd. hopper; No. 115, model 220, 2-cu.-yd.; No. 108, model 460, 3-cu.-yd.; No. 550, model 550, 4-cu.-yd. *Wayne Mfg.*

109—Steel Cans. In this 12-page catalog (No. 85) you will find specifications of galvanized cans and pails for every purpose. They include ash and garbage cans, oily waste and roller cans, large refuse cans, mopping pails, drum dollies, lids. *The Witt Cornice Co.*

110—Floor Cleaning Equipment. "Everything for Floor Care" says the cover of this 4-page brochure. It lists scrubbing, waxing, polishing, and mopping equipment, including self-propelled Scrubber-Vac machines; also waxes, sealers, and cleaners. *Finnell System, Inc.*

111—Floor Sweepers. For savings in sweeping manpower and time, 4-page brochure (59451) offers a choice of manual and motorized walkie-type floor sweepers. For big jobs, there's a motorized Turbo Sweep Model 40 that handles 50,000 sq. ft. per hr. *Parker Sweeper Co.*

112—Cathodic Protection. If structural corrosion is a problem, 8-page bulletin (TP-103-E-1) may tell you how to solve it. Shows in simple language how cathodic protection fights corrosion to protect water tanks, pipe lines, and the like. *Electro Rust-Proofing Corp.*

113—Scaffolds. Entitled "Controlling Costs When Maintenance Goes Above Arm's Reach," this 8-pager tells how to save money in off-the-ground maintenance by wise selection of a variety of scaffold equipment. Typical applications. *The Patent Scaffolding Co., Inc.*

114—Mechanics' Tools. Catalog No. 37-E (40 pages) describes and illustrates more than 60 timesaving hand and power tools. These in-

Better products, *faster*, from your Bearing Specialist:

Where the job assignment calls for accuracy in ball bearings, make all replacements with BCA

Top quality ball bearings easily identified by the red and white keystone on the box

When the job calls for new ball bearings, skilled maintenance men call for BCA. They know it pays to rebuild accuracy into the job the first time. And BCA quality bearings can eliminate costly replacements and accompanying downtime.

Reasons for BCA preference are many. Most important is uniformity of size, the end result of precision-engineering accuracy coupled with quality control throughout production processes.

BCA stocks are complete in the widest range of sizes and bearing styles to fit every need. Your Bearing Specialist who features the BCA line is ready to assist you on any bearing problem. Just call him.

BCA BALL BEARINGS

BCA

FEDERAL-MOGUL SERVICE

DIVISION OF FEDERAL-MOGUL-BOWER BEARINGS, INC. • DETROIT 13, MICHIGAN

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BEST PROTECTION

Your Floors Ever Had!

LEGSURE

only resin-type Polish to earn the famous York Seal

QUALITY CONTROLLED YORK RESEARCH CORPORATION

If you think all floor polishes are alike, wait till you try LEGSURE.

It's slip-resistant, scuff-resistant, dirt and water repellent. Self-polishing, it gleams like a new penny *with* or *without* buffing. Spreads evenly, dries in *minutes* with no tackiness.

WAIT TILL YOU SEE THIS REPORT CARD

Subjected to punishing Laboratory tests by York Research, LEGSURE piled up a stack of "Excellents" that would make a proud parent pop a button.

We'll gladly send a copy of the York report so you can prove to yourself there *is* a difference in polishes. That LEGSURE makes your floors look better, last longer. That it applies easily, functions perfectly with only routine maintenance and *Saves you Money* in labor and materials.

Clip the coupon or write today.

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FACTORY / CATALOG NEWS

Begins on page 308

For more information about these items, circle numbers on Reader Service card next to back cover.

clude conduit benders, cable pullers, etc. No. 37-H (20 pages) offers wood-boring bits and carpenters' hand tools. *Greenlee Tool Co.*

115—Portable Tools. Case-filled Catalog L-300 has 28 pages of ideas on the use of hydraulic tools for slashing machine repair costs. Catalog L-200 (40 pages) covers lifting equipment for general maintenance and construction jobs. *Blackhawk Industrial Div.*

116—Maintenance Tools. Set of three catalogs describes handy tools. No. A-9 (36 pages) lists tools for truck and tractor repairs. No. H-9 (16 pages) covers hand tools. No. P-9 (23 pages) lists hydraulic equipment and large size wrenches. *Owatonna Tool Co.*

117—Power Tools. Complete 1960 line of Skil tools and accessories is presented in a 60-page catalog for plant production, construction, and maintenance needs. Quick-reference index, specifications, and catalog numbers make selections easy. *Skil Corp.*

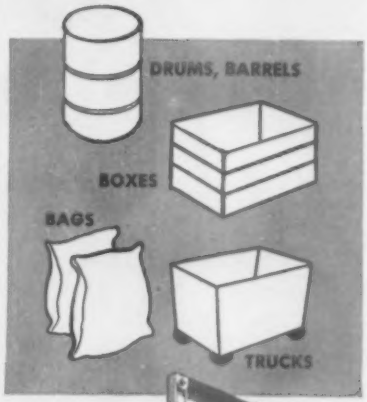
118—Steam Cleaners. Bulletin No. 4008 (8 pages) describes four models of Upgrader steam cleaner. Capacities range from 100 to 1500 gph. of hot cleaning solution. Smallest model is oil-, gas-, or electric-powered. Two largest models are oil-fired. *Vapor Heating Corp.*

119—Underground Insulation. Bulletin (16 pages) describes methods to protect and insulate underground steam lines, heating systems. Shows how coated perlite cuts installation costs. Graphs on low heat losses. *Insul-Fil Co., Inc.*

120—Plant Signals. Electric audible signaling equipment is covered in 86-page catalog (No. 160). Includes heavy-duty signals, light-duty signals, annunciators and useful accessories. Lists usages, types, selection hints, audible ranges. *Sperti Faraday Inc.*

Turn the page

the safe, *productive* way to **LIFT & DUMP ANY CONTAINER**



One of four basic types of Cesco dumpers.
Dumping Heights: 1 ft. to 50 ft. Capacities: 100 to 5000 lb.

• Just push a button, and your CESCO dumper lifts and dumps drums, barrels, bags, boxes, trucks — quickly and safely. You save manual labor, reduce hazards, boost productivity. Look around your plant now to see where CESCO dumpers can save for you. Special dumpers engineered to your requirements.

Send for helpful catalog A-7 describing complete line.

CONVEYORS & DUMPERS, INC.
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P. O. BOX 111, HILLSDALE, NEW JERSEY

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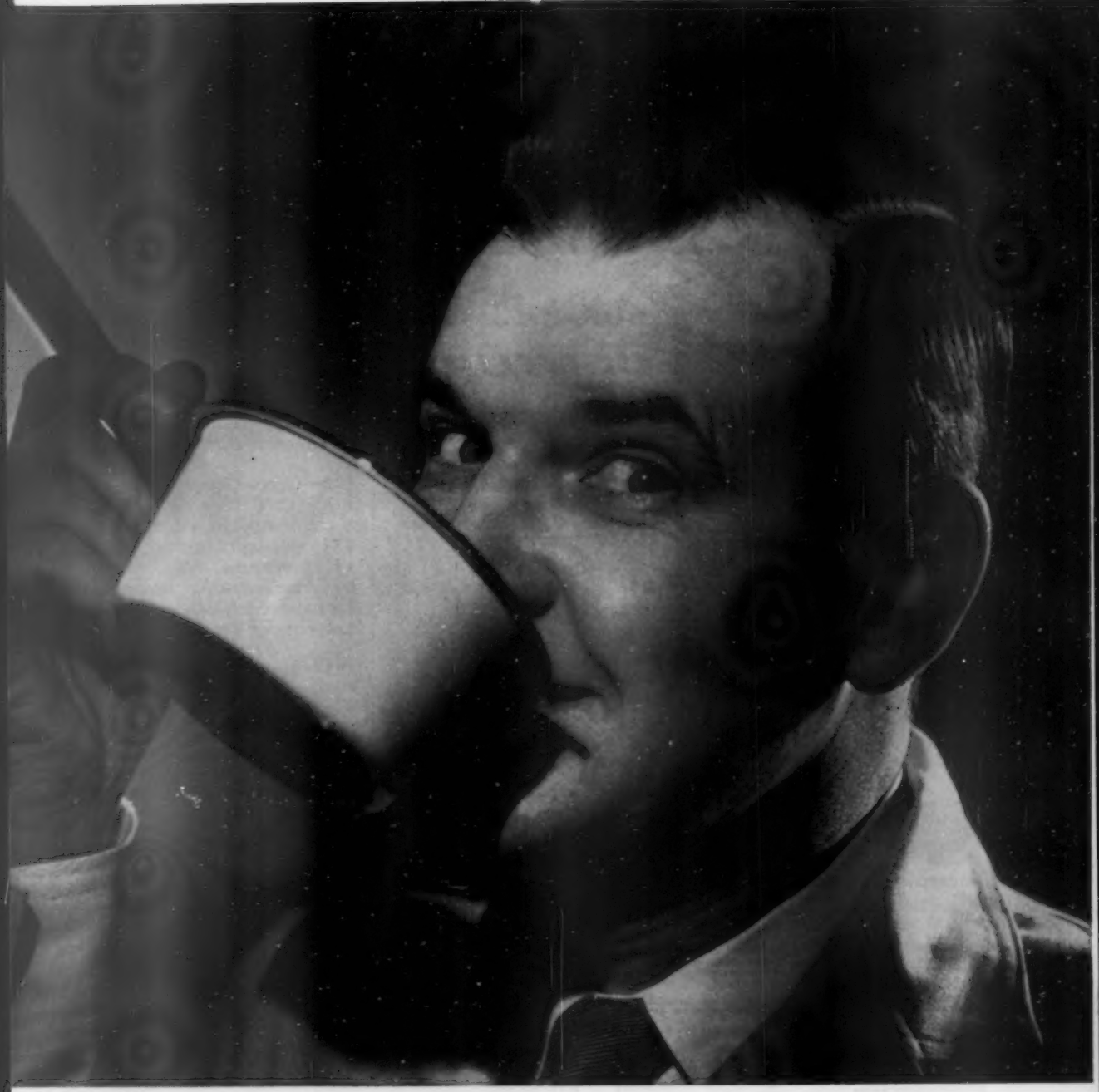

HE'S DRINKING A CORROSIVE LIQUID

It's only a drink of water, but it can be highly corrosive—the water source determines to a great extent just how corrosive it is.

Ground water from Utah, for example, is chemically different than ground water from New York . . . different enough to require a pump of different material to handle it most economically. In fact, there's nothing simple about handling water. Salt water, brackish water, hot water—each calls for a different pump material for best performance and longest pump life.

Take another example—distilled water. It's harmless to drink but it can eat the heart out of a pump. Distilled, deionized or demineralized water tends to corrode ordinary metals, and in doing so, the water becomes contaminated. In fact, the purer the water, the more corrosive it is. Worthington uses "Worthite"—a "super stainless" steel—to resist this corrosion and prevent contamination. Worthite will last indefinitely on distilled water service.

We at Worthington have accumulated a virtual encyclopedia of facts about water handling. Long years of experience have taught us how to select the proper pump for all types of water (or any other liquid) handling applications.

The next time you have a water handling problem, call Worthington—the manufacturer whose name is synonymous with pumps. You'll find your nearest Worthington district office or distributor in the yellow pages. Worthington Corporation, Harrison, New Jersey. 20-15

WORTHINGTON

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EXCLUSIVE CENTURY 3C METERING VALVE INSURES CORRECT AIR-FUEL MIXTURE

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MOST COMPLETE LINE FOR ALL LIFT TRUCKS

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OHIO
Auto & Aero Supply Company
4323 Spring Grove Avenue
Cincinnati 23
Austin Ignition Company
56 North Union Street
Akron 4
Continental Cleveland Corporation
1200 East 4th Street
Cleveland 14
The Propane Corporation
302 East 131st Street
Cleveland 8

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Material Handling, Inc.
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LP Gas Carburetion Equipment
& Supply Co., P.O. Box 1322
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Mid-States Auto Electric Co.
1905 South Michigan Ave.
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Company, 434-438 Carpenter
Street, P.O. Box 4, Evansville 8
Gulling Auto Electric Company
1201 Stadium Drive
Indianapolis 7
LP Distributors, Inc.
Cal-Ham Building, Bluffton
Maumee Propane Gas Company
3333 Maumee Avenue
Fort Wayne

IOWA
Bottled Gas & Equipment Company
1101 State Street, Bettendorf
Great Plains Gas Division of
National Propane Corporation
1101 Second Avenue, S.E.
Cedar Rapids
Munn & Cassaday, H.P. Station
Box 15, 4415 East 14th St.
DesMoines

KANSAS
Humburg Company, Inc., LaCrosse
Lundgren Motor Service
Garden City

MINNESOTA
Acme Carburetion
111 Nicollet Avenue, Mankato

MICHIGAN
Knorr-Maynard, Inc.
5743 Woodward Avenue, Detroit

MISSOURI
Medart Auto Electric Company
3134 Washington Blvd., St. Louis
Skelly Oil Company
P.O. Box 436, Kansas City 41
Superior Supply Company
1816 Walnut St., Kansas City 8

NEBRASKA
Auto Electric Service
2757 Farnam, Omaha
Industrial Irrigation Service
818 West Third Street, Hastings

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Locke Auto Electric Service
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Mutual Truck Parts
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Marvel-Schebler Products Div.
Borg-Warner Corporation
Decatur, Illinois

FACTORY / CATALOG NEWS

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For more about these items, circle item numbers on Reader Service Card next to back cover.

121—Vacuum Cleaners. Here are 12 pages of ideas on vacuum equipment for cleaning, servicing, or reclaiming materials. Bulletin No. 155B describes large built-in stationary systems, industrial mobile types, and custom-built equipment. *The Spencer Turbine Co.*

122—Closed-Circuit ITV. "Quick Reference Catalog," summarizes in 8 pages maker's line of industrial TV equipment. Includes cameras and accessories, video monitors, mounting accessories, lenses, cables, and connectors. *Allen B. DuMont Laboratories, Inc.*

123—Anchoring, Drilling Devices. Catalog No. 71 is a handy pocket-size 42-pager that lists and illustrates wood screw anchors, machine screws and bolts, expansion and self-drilling shields, toggle bolts, turnbuckles, other devices. *Arro Expansion Bolt Co.*

INSTRUMENTS AND CONTROLS

124—Pressure Gages. Here's a 4-page catalog (No. DH-333) that includes photos, exploded drawing, and specifications for heavy-duty, general-purpose gages. Come in 20 standard pressure ranges, with details of special features, applications. *American Chain & Cable Co.*

125—Closed Circuit Television. Short-form Catalog No. 6-103 tells, in 8 pages, what industrial TV can do. Shows equipment and accessories, illustrates wide applications, lists outstanding features. *Cohu Electronics, Inc.*

126—Security System. Components and accessories that provide a one-man electronic security system are presented in Brochure 4e/Mi. Explains advantages of the system for industrial plants. Lists functions and applications. Photographs. *Minneapolis-Honeywell.*

Turn the page

marking for effect

Paint your face and body vividly — red for life, black for death, blue for trouble — and you tell others of your life, your bravery and your tribal membership. For the Indian, this marking method was simple — yet it always had the desired effect.

We haven't a customer on our books who has bought any warpaint, but the identification and decoration problems people *do* give us invariably call for creating a distinct and lasting effect — to influence a sale, speed handling of parts to be assembled, prevent errors caused by unknown characteristics. This means we have to have some good answers to *everybody's* marking needs — in the form of machines to handle the various shapes, printing elements to leave a clear mark on all sorts of surfaces, inks that will stay put regardless of handling and abuse. The real trick is to get *just* the right machine, printing element and ink to do the customer's job as *he* wants it done — as contrasted to simply selling marking equipment.

What we've learned about marking in the last 48 years probably includes your industry and your product — and could provide practical ways to save you money, time and trouble. Call or write us, telling what you want your marking to accomplish. Markem Machine Co., Keene 18, N. H.

MARKEM

EVERYTHING INDUSTRY NEEDS . . . FOR PROFITABLE MARKING . . . SINCE 1911

Even a ROCKET ENGINE sometimes needs a lift!

Courtesy of ROCKETDYNE a division of North American Aviation, Inc.

One of the complications of building rocket engines is the necessity of proving them. Rocketdyne transports the thrust chambers for the Atlas intercontinental ballistic missile engine on a transportation dolly to its test site, where they are rolled over a Southworth Lift Table*, which lifts them into relative position. After the thrust chamber unit is elevated and the engine oriented in the test stand, the table is lowered, and the carriage rolled off into the roadway. Seems simple – after the fact!

When your work-positioning problem includes elevating, call in a Southworth engineer. Perhaps a Southworth Lift Table can help there, too.

This is the Southworth L-2 which was adapted for Rocketdyne. For further details on our four Series of Lift Tables, capacities from 500 lbs. to 24,000 lbs.; vertical travel to 64", write to:

*PATENT PENDING

SOUTHWORTH MACHINE CO. since 1890

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a division of SOUTHWORTH MACHINE CO., 534 Warren Ave., Portland, Me.

For more facts Circle 870 on Reader Service Card

FACTORY / CATALOG NEWS

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For more about these items, circle item numbers on Reader Service Card next to back cover.

127—Production Recording System. Easy-to-read 12-page booklet (illustrated) is called "Can Efficiency Be Measured?" It tells how an automatic system (Centralograph) fits into production operations, tracks machines and output, speeds planning and costing. *LM Ericsson.*

128—Counters. Three 4-page bulletins describe, respectively, a new quick-reset counter, a full line of predetermining counters, and a complete line of mechanical and electrical counters. All bulletins are fully illustrated, give specifications. *Veeder-Root, Inc.*

129—Electroplating Rheostats. Bulletins CPR-100 and CPR-200 (4 pages each) give specifications, applications, operating instructions, tables of sizes and ratings. Include drawings and graphs for carbon-pile rheostats. *Hanson-Van Winkle-Munning Co.*

130—Counters. Three booklets list applications, specifications, wiring diagrams, and components of accessories for amplifiers (14 pages); print-out recorders (18 pages); time recorders and totalizers. Well illustrated. Data clearly organized. *Standard Instrument Corp.*

131—Time Count Controls. Here's an illustrated 4-page folder (Bulletin No. 10) that describes and gives applications for complete line of manual and reset timers, repeat-cycle timers, counters, step switches, package controls, and the like. *Eagle Signal Co.*

132—Temperature Regulators. Bulletin 620 (10 pages) tells story of self-powered temperature regulators with types 21, 22, and 14 thermostats. Tables give valve capacities and dimensions; charts show steam flow lb. per hr. Includes diagrams and photos. *Sarco Co.*

133—Computer Systems. This 16-page booklet, "Computing in IBM," describes problems of design, engineering, optics, quality control, job

Hoover pillow blocks with ductile cast housings

Hoover introduces a new, economical pillow block ball bearing unit with cast housing of ductile material that absorbs shock and vibration, assuring long bearing life. It is designed to carry light loads at normal speeds.

The unit contains a pre-lubricated bearing featuring ultra-smooth *Hoover Honed* raceways and a perfectly matched set of *Micro-Velvet* balls, a guarantee of unexcelled quality. Known as the E D series, these new pillow block bearings are available in shaft sizes from ½" to 1¾".

Hoover also offers a cast iron pillow block bearing for light to medium load conditions, plus a wide range of flange and machine units.

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Zone Sales Offices and Warehouses	8581 South Chicago, Chicago 17, Illinois 290 Lodi Street, Hackensack, New Jersey 2020 South Figueroa, Los Angeles 7, California

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F-5

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Please send new Bulletin 106, which describes Hoover pillow block ball bearings.

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Title_____
Company_____
Address_____
City_____ Zone_____ State_____

Guard your plant with "SYN-FLEX"

U.S. PAT. NO. 2392967

Lightweight NEOPRENE COVERED FIRE HOSE

Check these advantages...

1 —Basic lightweight "FIRE-FLEX" construction . . . 50' coil of 2" weighs only 35½ lbs., with diameter of only 22". Compare *that* with regular rubber-covered fire hose!

2 —Black "Synplastic"® cover is highly resistant to abrasion and action of chemicals, oils, grease.

3 —Does not require drying after use.

4 —Extremely flexible . . . easy to handle.

5 —ECONOMICAL because of its long service life.

300 LB. TEST

"SYNFLEX" is a modern fire hose especially designed for the Chemical, Petroleum and allied industries.

"If it's GOODALL, it MUST be Good!"

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FACTORY / CATALOG NEWS

Begins on page 308

For more about these items, circle item numbers on Reader Service Card next to back cover.

simulation, and the like, that IBM computer systems have solved. Diagrams, charts, photos. *International Business Machines Corp.*

134—Central Control System. "Selectographic Supervisory DataCenter" is title of an 8-pager (AIA. File No. 30-E) that tells what this central automatic control system does, how it works, how to specify it for various mechanical systems. *Minneapolis-Honeywell.*

135—Control Center. Bulletin No. 6200 (16 pages) discusses central control system that governs all motors for a given operation, process, plant. Photos show special construction and electrical modifications, installations, components. *Clark Controller Co.*

136—Measuring Instruments. Catalog No. OS-106 has 16 pages that present large screen, monitor, bargraph oscilloscopes, accessories. Discusses features, specifications, applications for each measuring and testing instrument. *International Telephone & Telegraph Co.*

137—Automatic System Controls. Bulletin F-8944 (8 pages) contains features, applications, and selection criteria for automatic systems that control temperature, humidity, air distribution in heating, ventilating, and other installations. *Barber-Colman Co.*

138—Cycle Controller. This 12-pager (Bulletin C311) gives details on construction, operation, and application of a new cycle controller for timing batch processing. Mounting dimensions diagram, timing disk data. *The Bristol Co.*

139—Central Control. Four-page folder (Form ACCOP) describes and pictures central operations panel for control of utility functions. Has schematic wiring diagrams, quick run-down of operating features, and description of auxiliary components. *General Time Corp.*

Turn the page

For more facts Circle 872 on Reader Service Card

For more facts Circle 873 on Reader Service Card ➤

Fairbanks Nº 1

a scale, our first one.
an imagination of iron, brass, copper and lead,
fashioned in a New England workshop.
inanimate.

but it spoke—
a different kind of language,
of pounds and ounces and fractions thereof
and it spoke only the truth.

it felt—
the roundness of grain, the smoothness of marble,
the sweetness of candy and the authority of gold.

it heard—
the sound of life, babies newborn
it cradled them and recorded their growth
until pounds and ounces were replaced
by years and months.

it traveled—
by packet boat down the Mississippi,
by clipper ship to England,
The Sandwich Isles, the Indies,
South America and China.
better known throughout the world
than anything else made in America.

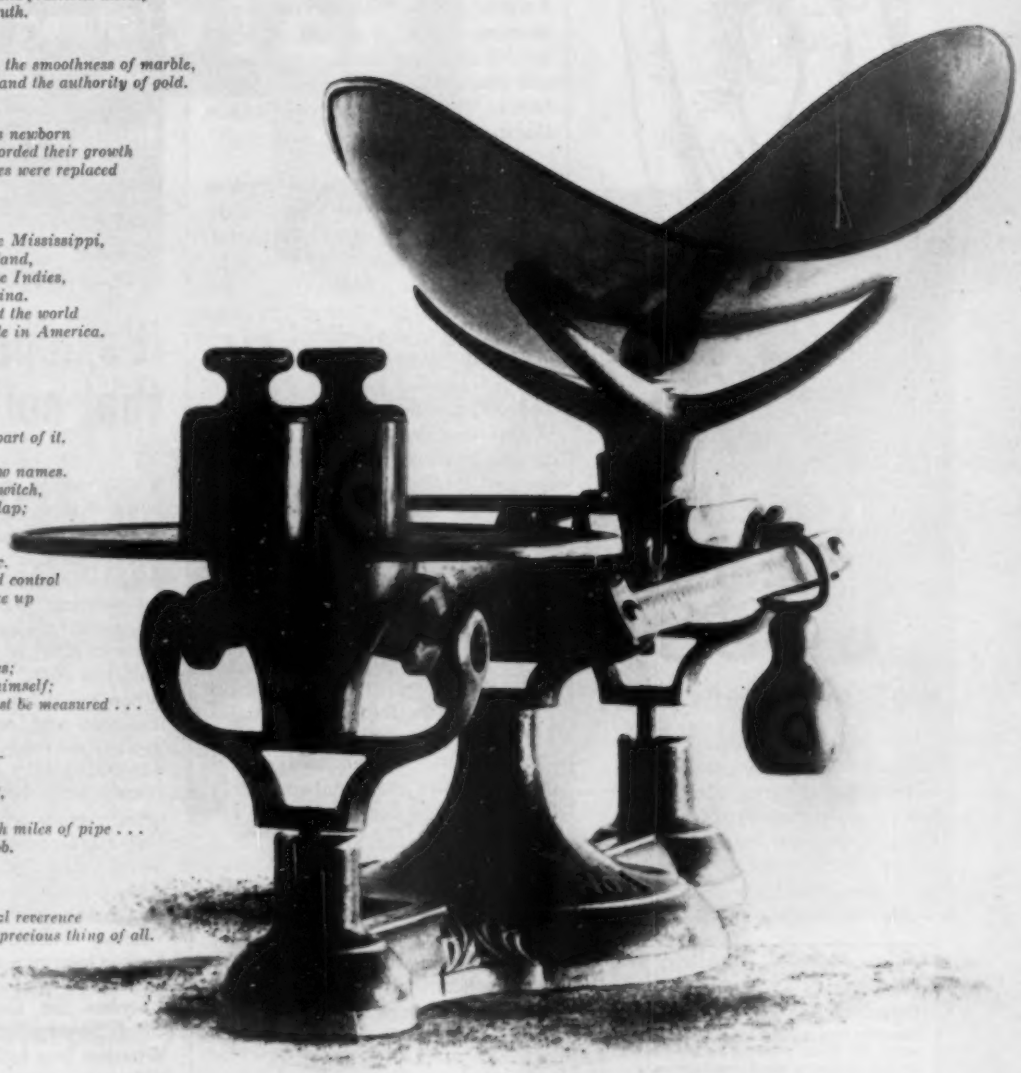
it was relied on
by farmers, merchants,
scientists and doctors.
it witnessed history;
influenced it and was part of it.

its descendants have new names.
floaxial dial, mercoid switch,
reed switch and cotton lap;
remote control,
printomatic,
electronic and levetronic.
all serve to evaluate and control
the substances that make up
the universe.

raw materials
or manufactured articles;
things unseen or man himself;
all have weight and must be measured . . .
our scales do the job.

and the new challenge—
weight in motion . . .
freight trains in transit,
trucks too busy to stop,
liquids coursing through miles of pipe . . .
our scales will do the job.

but this was our first—
Fairbanks No. 1
and we hold it in special reverence
for it weighed the most precious thing of all.
it weighed an idea.



Fairbanks, Morse

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Scales for heavy industry and for business; scales for science and for the home. Scales that weigh milligrams or millions of pounds. Scales that weigh missile fuel loads at Cape Canaveral; trucks on the Golden Gate Bridge; onions at your neighborhood grocer's . . . we make every kind of scale for every kind of purpose, including electronic scales. We are the Number 1 manufacturer of scales and automated weighing systems in the world.

If you have a problem where the careful calculation of weight is of vital importance, please write to Mr. Robert W. Kerr, President, Fairbanks, Morse & Co., 600 So. Michigan Ave., Chicago 5, Illinois.

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with Dravo *Counterflo* Heaters

Learn how one company switched to Dravo *Counterflo* warm air space heaters and reduced their heating bill by more than $6,000 per year. Plant is warmer, too, and 3,400 square feet of valuable space were made available for manufacturing.

Use the coupon for full details.

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Pittsburgh 25, Pa.

Send me free copy of 12-page report on warm air space heating and the facts on the company mentioned above.

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Position_____
Company_____
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Zone_____ State_____

DRAVO
CORPORATION

FACTORY / CATALOG NEWS

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For more about these items, circle item numbers on Reader Service Card next to back cover.

140—Data Processing. Bulletins No. 103 (digital control computer, 4 pages) and No. 110 (magnetic-core memory system, 4 pages) tell about solid-state electronic data-processing and process-control systems. Gives factors for economic justification. *Daystrom, Inc.*

141—Electronic Computing System. This 6-page brochure (S-483) describes new RPC-4000 transistorized electronic computing system for general-purpose engineering and business data processing. Includes specifications, components, and applications. *Royal McBee Corp.*

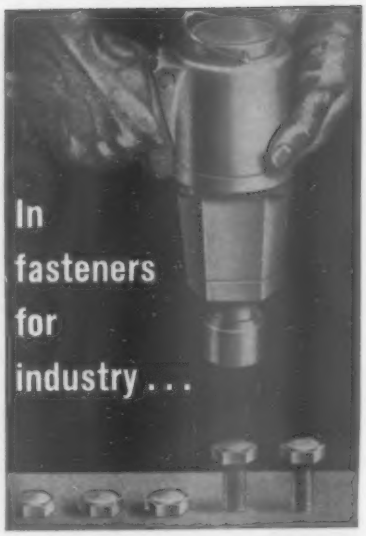
142—Recording, Control Systems. Digital modular elements for applications in recording and controlling in-plant processes are covered in this 8-page illustrated booklet. Describes equipment, in-process testing, components. Explains services available. *Datex Corp.*

143—Precision Test Equipment. Useful short-form 1959-1960 catalog in 6 pages gives specifications of precision electronic instruments. These instruments measure and check reactance of networks; calibrate receivers and signal generators. *Boonton Radio Corp.*

144—Proximity Meter. Manual TM-951-2 discusses circuits, dimensions, and applications of a capacitance-operated proximity meter. Uses: gaging (without physical contact) concentricity, surface finish, vibration, pressure, thickness. *Robertshaw-Fulton Controls Co.*

145—Flowmeter. Technical Sheet S9 has electrical characteristics, mechanical specifications, and applications of a flowmeter that measures flow of liquids in a pipe with high-frequency vibrations. Test graphs of stability, linearity. *Gulton Industries, Inc.*

146—Closed-Circuit Television. New 112-page catalog gives complete listing of industrial television equipment. Covers cameras, hous-



it's dependability that counts!

Yes, *life* often rests on the dependability of the fastener.

Whether for bridges, pressure piping, skyscrapers, railroads, transformers or tunnels . . . or even your personal car, it's the *dependability of the fastener* that counts. The fastener must be *stronger . . . more dependable* than the part.

When you visit our manufacturing facilities and control laboratories, you will see for yourself how we build dependability into our IMPACT-FORM'D nuts, bolts and screws.

IMPACT-FORM'D Screw and Bolt fasteners are produced to customer demand every day:

- free—or interference-fit rail bolts
- high strength heat treated bolts for heavy construction
- close tolerance components for machinery
- screws for electronic equipment and accessories

Whether you follow industry standards or have your own specifications, IMPACT-FORM'D Screw and Bolt fasteners have the *dependability* you need.

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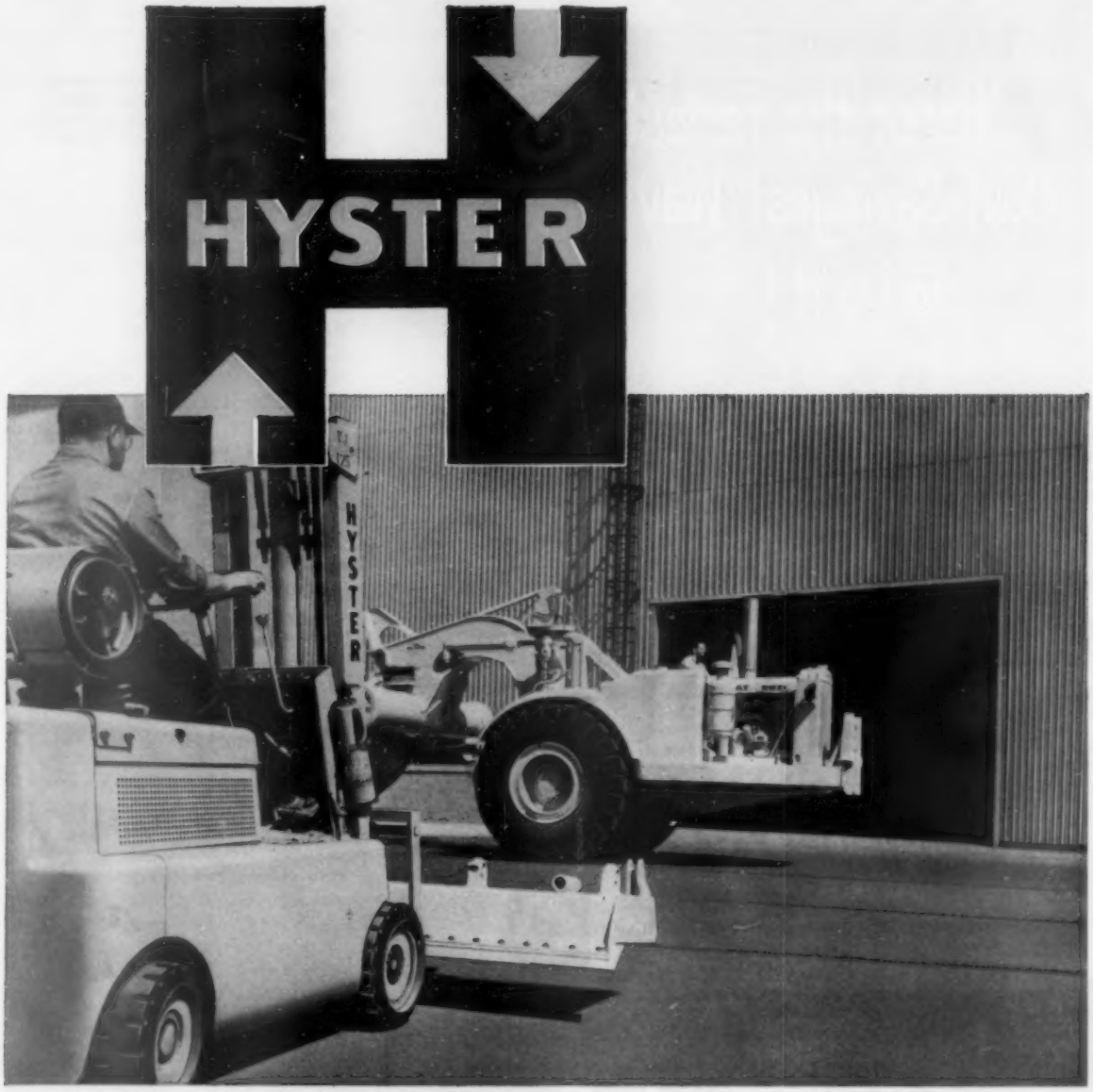
SCREW AND BOLT CORPORATION OF AMERICA
P. O. Box 1708 Pittsburgh 30, Pa.

DIVISIONS: *Pittsburgh Gary · Southington Hardware American Equipment*

America's Most Complete Line of Industrial Fasteners



Monotrol selected by Caterpillar Tractor Co.

Only

HYSTER® has it!

Hyster Monotrol equipped 5,000-lb. cushion tire trucks increase capacity for handling of parts and sub-assemblies at the Caterpillar Tractor Co. plant at Joliet, Illinois.

Driver fatigue reduced—safety improved.

Monotrol—a Hyster exclusive—the most modern control system. Frees operator's hands for full time steering and load control.

Call your Hyster dealer, or write for literature.

INDUSTRIAL TRUCK DIVISION—Lift trucks, mobile cranes, straddle carriers
TRACTOR EQUIPMENT DIVISION—Construction and logging equipment
MARTIN TRAILER DIVISION—Heavy machinery hauling trailers
INTERNATIONAL DIVISION—Overseas manufacturing, sales and service
Factories: Portland, Oregon (Home Office) • Danville, Ill. • Peoria, Ill. • Kewanee, Ill. • Nijmegen, The Netherlands • Glasgow, Scotland • Sao Paulo, Brazil • Sydney, Australia (Licensee)

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P. O. Box 847 • Danville, Illinois

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RIDGID®

535 Pipe & Bolt Threading Machine

Just 1 Universal Die Head and 2 Sets of Dies Threads ½" to 2"

Cuts Die Changing 66%—Two sets of dies do the work of six . . . adjust to size right in machine. One set for ½" and ¾"; the other for 1", 1¼", 1½" and 2". All other RIDGID quick-opening pipe and bolt die heads and dies can be used.

No Slow Back-Off—Quick flip of throw-out lever retracts dies instantly, after thread is cut.

Fast Chucking—RIDGID Speed Chuck grips tight, forward or reverse . . . sets and releases fast by hand. Tools swing out of way for chucking of short lengths from front.

Always True Threads—Cam-action rear-centering device gives extra support for long pipe lengths . . . no wobble.

Full-Floating Cutter—Roll-type cutter with large easy-to-turn handle has full-floating action for smooth cuts, even on out-of-round or bent pipe.

Smooth Reaming—Five heat-treated straight cutting flutes ream ⅛" to 2" pipe or conduit fast and smooth.

No Oil Waste—Self-contained oil system has vane-type pump that circulates oil when nozzle is positioned for threading.

Easy-to-Read Length Gauge—Sliding indicator gives accurate cut-off and thread lengths. Large lathe-type handle controls tool movement.

Plenty of Power—Fast, trouble-free universal-type ½ h. p. motor, reversible at switch, easily threads up to 12" pipe with geared tools.

See and Try the Time-Saving RIDGID 535 at Your Supply House!

RIDGID®

The Ridge Tool Company, Elyria, Ohio, U.S.A.

FACTORY / CATALOG NEWS

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For more about these items, circle item numbers on Reader Service Card next to back cover.

ings, lenses, monitors, switchers, microwave gear, tape recorders, and other components and accessories. *Radio Corp. of America.*

147—Closed-Circuit Television. Eight-page booklet titled "Closed-Circuit Television Systems. . ." has photos and specifications of industrial television cameras, control units, control panels, monitors, and accessories. *International Telephone & Telegraph Corp.*

148—Insulation Testing. "Insulation Resistance Measurements" is the subject of this 32-page booklet (No. P 14556). It describes procedures for using "Vibrotest" to measure insulation resistance on motors, generators, transformers, etc. *Associated Research, Inc.*

149—Vacuum Gages. Catalog No. 175 (6 pages) describes principle of operation, and lists advantages of gages that are compensated for temperature and rate of temperature change. Helpful tables give pressure ranges, model types, and special features. Illustrates accessories. *Hastings-Raydists, Inc.*

MATERIALS

150—Liquid Sealant. Leaking joints and simple assembly problems are discussed and solved in an 8-page brochure (No. 204). Tells how to stop breakdowns caused by loose nuts and bolts. Includes charts and tables to calculate costs and savings. *American Sealants Co.*

151—Wax Cutting Fluids, Coolant. There's a water-soluble or oil-type coolant for your cutting and grinding operations in a 16-page booklet (ADV2095). An 8-pager (ADV4059) contains data on coolant that stays clean, stops rust, resists rancidity. *S. C. Johnson & Son.*

152—Insulating Materials. From this 12-page booklet (GET-2929A) learn all about insulating materials for electrical equipment. Data and

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For more facts Circle 878 on Reader Service Card

Nothing takes a bigger beating than your floors...

Only Masterplate floors take this concentrated traffic

2,000,000 lbs. of food are received, stored and shipped in a single day at this Purity Stores, Ltd. warehouse

Where long floor-life and cleanliness are musts (as in this seven-acre Purity Stores, Ltd. warehouse) MASTERPLATE iron-armoured floors do the job better and more economically.

The thick, tough MASTERPLATE floor surface easily withstands the severe day-in, day-out abrasion of 234 tow conveyor trucks (with capacities up to 4000 lbs.). Food stuffs rolling out of Purity's warehouse to over 100 retail outlets are cleaner . . . because the MASTERPLATE floor does not "dust".

A MASTERPLATE floor costs less because:

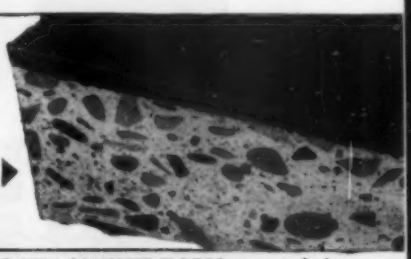
- It lasts 4 to 8 times longer than the best plain concrete floor.
- It virtually eliminates costly shutdowns or interruptions.
- It costs less to keep clean.

Before you install or replace another floor, call in the local Master Builders fieldman for full information. Our unique "Floor Package" includes not only a *superior product*—MASTERPLATE—but 50 years of *application experience* on all types of installations, plus *on-the-job service* by a skilled MASTER BUILDERS field man.

The Master Builders Company, Cleveland, Ohio

Division of American-Marietta Company

World-wide manufacturing and service facilities



MASTERPLATE provides a thick . . . tough . . . malleable iron-armoured floor surface.

CONCRETE BASE SLAB FOR MASTERPLATE surface can be monolithic or two-course.

FOR FINISHING NEW CONCRETE FLOORS or re-surfacing old concrete floors—MASTERPLATE withstands impact . . . is oil resistant and virtually non-absorbent . . . easy to clean . . . resistant to many industrial corrosives and strong cleansers . . . *and outwears the best plain concrete floor 4 to 8 times* according to tests by top independent testing authorities.

"TRACER LIGHTS" show typical, continuous, heavy floor traffic pattern of the "in-the-floor" tow conveyor trucks at Purity Stores, Ltd., Burlingame, California. • Chief Engineer—Purity Stores, Ltd.: Arthur Allison • Structural Engineer: H. M. Engle, San Rafael, California • Design Consultant: Harry Weese, Chicago, Illinois • Contractor: Younger Construction Company, San Francisco, California • POZZOLITH Ready-Mixed Concrete: Consumers Rock and Cement Co., San Francisco, California.

MASTER BUILDERS®
MASTERPLATE*

*MASTERPLATE *is a registered trademark of The Master Builders Co. for its specially prepared, metallic aggregate for producing iron-armoured concrete floors.*

DAY

DUST CONTROL NEWS

Free! 9 informative

dust control equipment bulletins

You can save time when planning and save money when buying if you'll send for these DAY dust control bulletins. Each contains valuable information about dust control equipment and systems. Here's general information plus useful technical data and specifications. Ask for any bulletin which interests you or write for them all – they're free. Use this magazine's reader service card or write direct toDAY.

BULLETIN G-579 — Describes the DAY Type "RJ" filter. An all purpose, versatile unit. Bulletin gives operating features, dimensions and specifications.

BULLETIN 573 — Dual-Clone dust separators — noted for their low resistance and high cleaning efficiency. Easy to install, no maintenance, no moving parts.

BULLETIN 576 — "HV" heavy duty dust separator. Rugged construction and lower initial cost than many light gauge galvanized type cyclones.

BULLETIN F-75 — Reverse Jet Dust Filter Facts. Complete with specifications, typical equipment layouts, capacity and performance tables for DAY type "AC" filter.

BULLETIN N-578 — Gives complete information about Style "A" rotary valves. Construction features, specifications, dimensions and applications.

"SCHLITZ DEFEATS DUST" — FOOD ENGINEERING magazine reprint describes all out-dust control for 3½ million bushel Schlitz grain elevator. Request Bulletin "Schlitz Defeats Dust."

"EFFICIENT DUST SNATCHERS" — Bulletin describes DAY's part in providing maximum safety and good housekeeping for starch packing building of large food processor.

BULLETIN 510 — DAY Unit Dust Collectors. Complete, low cost unit designed for plants or applications where central dust control systems are not practical.

BULLETIN I-585 — Industrial Fans. Complete with helpful selection charts, capacity tables, dimensions and specifications. Information on special types and arrangements included.

The **DAY** *Company*

SOLD in UNITED STATES by
The DAY SALES Company
850 Third Avenue N.E.
Minneapolis 13, Minnesota

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The DAY Company of Canada Limited
25 Brydon Drive
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Representatives in Principal Cities

EQUIPMENT ONLY OR A COMPLETE SYSTEM

FACTORY / CATALOG NEWS

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For more about these items, circle item numbers on Reader Service Card next to back cover.

applications for mica mat, built-up mica, coated materials, varnishes, paints, adhesives, wire enamels. *General Electric Co.*

153—Floor Care. A complete floor maintenance program could be worked out from this 8-page folder (No. 1561). Contains equipment and compounds for light or heavy-duty jobs. Chart tells what type wax, cleaner, sealer, or finisher to use. *Multi-Clean Products, Inc.*

154—Oil Absorbent. If your safety record could be improved at your plant, read all about this oil and grease absorbent. One 6-page folder (No. 203) tells you what Sol-Speedi-Dri does. Another 4-pager (No. 2) gives 101 applications. *Minerals & Chemicals Corp. of America.*

155—Silicones. Do you know how silicones can improve your operation? This 16-page booklet (No. 1-115) gives properties of each type and applications. Covers adhesives, dielectrics, lubricants, coatings, textile finishes, release agents. *Dow Corning Corp.*

156—Adhesive Tape. Catalog No. 106 (10 pages) shows how to make maintenance work easier. Tells uses of tape in painting, wiring, etc. In the construction line? Then this 16-pager (No. 108) has many applications for tapes and adhesives in your plant. *Permacel.*

157—Paints. Facts you should know about painting are given in 12-pager (No. B-824), "How to save safely when painting your plant." Selection guide tells at a glance right finish for your application. *Sherwin-Williams Co.*

158—Roofing Material. Whether you're building a new roof or repairing an old one, Tropiglas fibrous glass may be the answer. A 4-page folder tells how to save money on roof repairs with this lightweight, rotproof, blisterproof material. *Tropical Paint Co.*

Turn to page 352

Just 75 years ago, heating was about as unpredictable as the weather, as temperatures alternated between shivery low and smother-high. Then a Wisconsin schoolteacher named Johnson decided to do something about classroom comfort and thereby launched a new industry!

The Story of the Thermostat

Actually this is the story of a symbol . . . the symbol of an industry that has brought comfort, safety, better health, and efficient working conditions to people all over the world.

. . . In a specially equipped manufacturing plant, delicate missile parts and components, with micro-inch tolerances, must be made under temperature and humidity conditions that never vary. At every step in their manufacture, modern pneumatic controls assure error-free regulation of the thermal environment.

. . . A multi-million dollar computer laboratory undertakes a difficult problem in space-age design calculations. To prevent costly damage, the complex data processing equipment must operate within precise limits of temperature and humidity. Another important job handled best by pneumatic controls!

. . . In a hospital, surgeons perform a lifesaving operation. Accurate pneumatic controls maintain the temperature and humidity at preselected levels to conserve the patient's strength during surgery.

. . . Far at sea, one of the nation's deadly new submarines cruises undetected, an elusive, power-laden sentry of the "Silent Service." Her crew lives and works in comfort and safety — in a climate precisely regulated by a pneumatic control system.

. . . Across the continent, pneumatic controls assure safe air conditions in the highly critical processing areas of an atomic energy facility. Pneumatic controllers of extreme sensitivity operate constantly to assure safe disposal of waste air and prevent the escape of contamination.

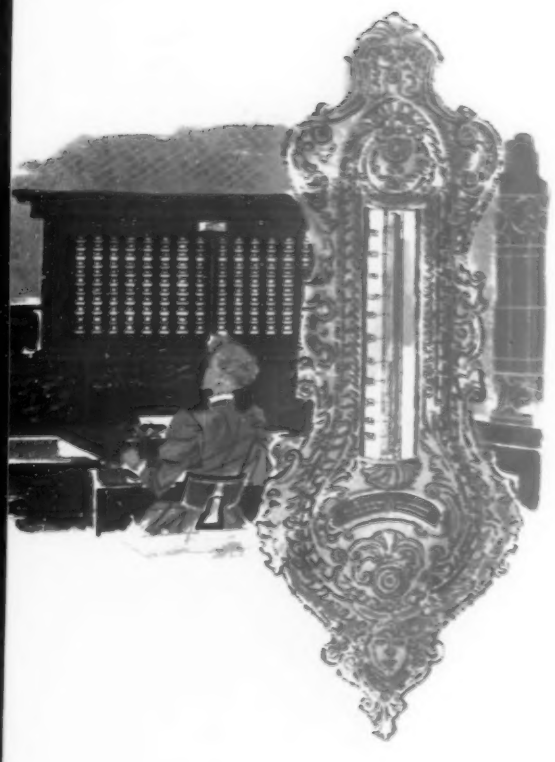
These are but a few examples of the ways in which modern pneumatic controls play a vital part in regulating the environment in which we live and work — helping to create made-to-order indoor climate for every purpose, controlling temperatures and humidities to a degree undreamed of when Professor Warren S. Johnson invented the first automatic temperature control system back in the 1880's.

Inventor at Work

Though he was probably unaware of the fact at the time, Professor Johnson became the founder of the automatic temperature control industry when he devised a practical way to eliminate the problem of classroom temperatures that seemed to zigzag forever between shiver and swelter.

His first attempt at control — the "annunciator" system — merely called the janitor's attention to overheating, or lack of heat, by ringing a bell in the furnace room. The janitor would then open or close the classroom dampers, as required.

But this land-based version of a ship's telegraph soon gave way to an all-electric method, utilizing a thermostat in each room that would open and close the dampers automatically. And so, the first system of automatic heat regulation was born.



The Electro-Pneumatic System

Intrigued with the possibilities of his long-awaited discoveries, Professor Johnson in 1883 left his post at Whitewater, Wisconsin, State College and came to Milwaukee to devote full time to refining and marketing the Johnson System.

His second major achievement, an electro-pneumatic control system, occurred almost at once. By successfully uniting the forces of *electricity*, for thermostat operation, and *compressed air*, for valve and damper operation, he developed a far more dependable and fully automatic control system. Finally he was ready to go out and revolutionize the comfort standards of the world. In 1885, he incorporated the business which today bears his name.

With branches established in Chicago, St. Louis, and New York, the Johnson thermostat on the wall soon became a familiar sight in the leading buildings of the day. Schools, prominent residences, and small business buildings were first to enjoy the comforts and economies of automatic control. They were followed closely by colleges, hospitals, public buildings, offices, stores, and industrial plants.

From Mikado to Czar

Acceptance grew, markets widened. The fame of automatic controls traveled fast and far. Before 1890, the city of Berlin, Prussia, had written a report about the efficiency of its Johnson System. Later, the palace of the Mikado in Japan was equipped with Johnson Control. The King of Spain and other European royalty became Johnson customers. A special installation was made in the Kremlin in Moscow!

Single Responsibility

Professor Johnson had the foresight to realize that the key to his success depended upon the *proper application* of his controls. Accordingly, he determined, from the outset, that his company should *never sell devices*, but should sell a *principle of control*. This meant that each system would have to be planned, manufactured, installed, and serviced *by Johnson* to meet the exact needs of the individual building.

Over the years, this policy of complete responsibility by a single specialized organization has insured owner satisfaction and saved untold millions of dollars for Johnson customers.

Carrying out this policy has also resulted in the closest possible working relationship between the Johnson organization and the nation's consulting engineers and architects, in a joint effort to provide ever better control of thermal conditions.

Many Johnson "Firsts"

The history of the thermostat and the Johnson Service Company coincides with the period when other pioneers were busy introducing innovations in heating, cooling, and ventilating methods and in developing full-scale air conditioning. Working closely with the research staffs of these manufacturers, Johnson engineers were able to supply the most effective controls for every new development in basic equipment. This cooperation has continued and flourished to the present.

Over the years, the Johnson Service Company has been the source of a never-ending flow of new ideas, which have included virtually all of the key developments in the field of automatic temperature control!

By far the most important was the all-pneumatic control system, perfected in the 1890's and still the standard everywhere. Others include the all-metal thermostat, the famous *Dual* or day-night thermostat, the heating-cooling thermostat, summer-winter thermostats, the airstream thermostat, master-submaster thermostats, supersensitive gradual-acting thermostats, and powerful piston damper operators.

Another famous development was the Humidostat or humidity regulator. And, of course, the Comfostat, an exclusive Johnson instrument that controls room temperatures in relation to humidity conditions. The popular pneumatic control center, for centralized supervision and control of modern air-conditioning systems, also was first perfected by Johnson.

Uninterrupted Progress

As the concept of controlled environment gathered momentum, so did Johnson. Important "firsts" became routine jobs, as the industry looked to Johnson for the answers to new control problems. From the simple comfort needs of the buildings of the 80's and 90's, to the history-making demands of the first scientifically air-conditioned building, down to the most complex requirements of today's commercial and industrial buildings, Johnson has been the leader in the pneumatic temperature control field.

Johnson has an especially noteworthy record in meeting the intricate and highly diversified control needs of industry, with installations in thousands of leading manufacturing and processing plants.

In other fields, too, wherever you go, you'll find the important buildings are equipped with Johnson Control. From the fabulous Fontainebleau Hotel to the mammoth Merchandise Mart to the famous UN Secretariat Building . . . in schools, in hospitals, in research laboratories, in vital military installations, in shopping centers, in buildings of *every* size and type and in ships at sea . . . there are temperature and air-conditioning control systems by Johnson.

Johnson Today...and Tomorrow

To make certain that each installation performs up to expectations, Johnson backs its engineers with the most complete line of pneumatic temperature, humidity, and pressure control equipment in the industry.

To serve you most efficiently both before and *after* a sale, Johnson maintains the largest and most experienced field organization in the industry, with 107 completely staffed branch offices in the United States and Canada, plus full-time, factory-trained installation and service mechanics in over 200 other cities.

This is by no means the end of the story of the thermostat. For against this unmatched background of innovation, experience, and service, Johnson's never-ending search for new and better controls will inevitably lead to dramatic new ideas in the years ahead. As the day of completely air-conditioned cities approaches and as new and unprecedented demands for precision controls evolve, the forward-thinking Johnson organization will always be ready with the right answers.

The Johnson research and development staff and facilities have been expanded three times in the past four years. And final plans for the next major expansion are already underway! In the future then, as in the past, you can continue to look to Johnson for the world's finest controls!

Johnson Service Company, Milwaukee 1, Wisconsin. In Canada: Johnson Controls Ltd., Toronto 16, Ontario.

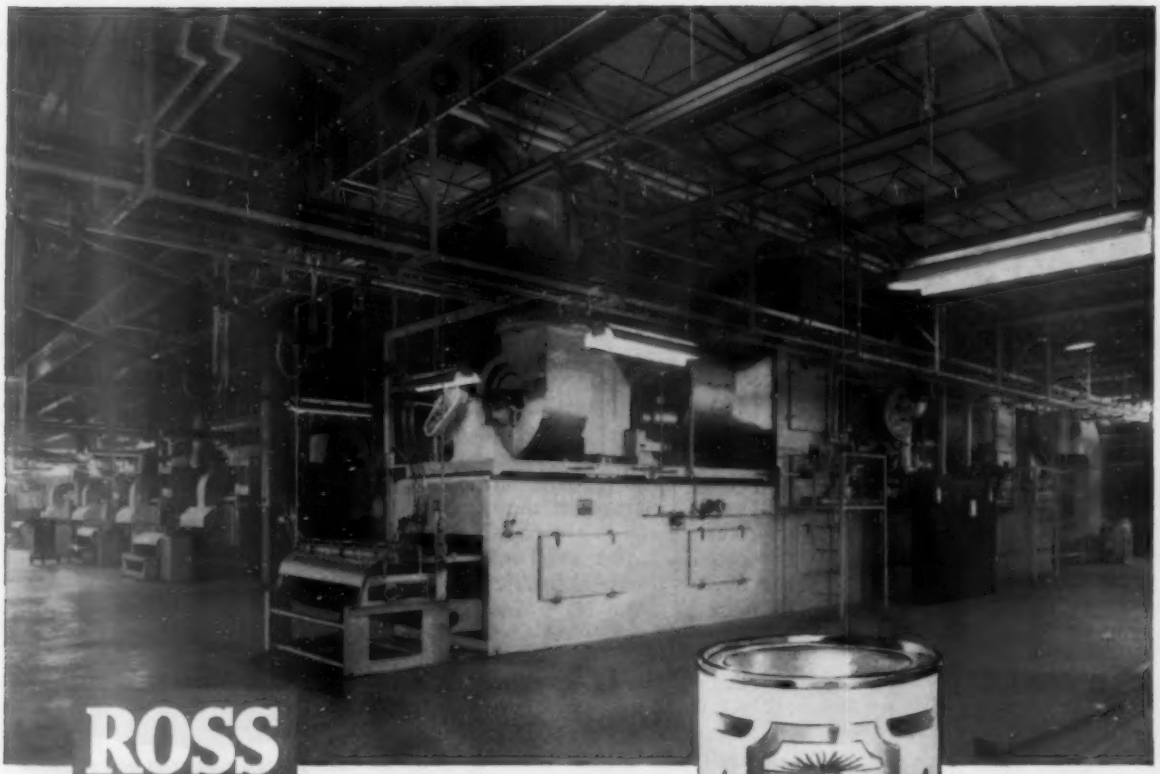
JOHNSON CONTROL

PNEUMATIC SYSTEMS

DESIGN • MANUFACTURE • INSTALLATION • SINCE 1885

AD 1076

Printed in U.S.A.



ROSS
Air Systems

...Engineered Atmospheres for Better Processing

Beer and Beverage Can OVEN—1960 Model

Installed in late 1959, this conveyorized Ross Oven is in full production baking the inner linings of beer and beverage cans at the rate of 1000 cans per minute.

One of several basic types, this particular automatic unit was designed to fit the special production needs of Continental Can Company at one of its modern plants. Over the years, Ross Engineers have designed and installed over 100 beer and beverage can baking ovens in the major can manufacturing plants throughout the United States. Many of the earlier units are still in full and, in many cases, excess production, implying both sound design engineering and sturdiness of construction.

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Not a paint or plaster . . . a protective, decorative finish

This brush-on, easy-to-use *adhesive* coating is the *answer* to finishing new masonry or refinishing old masonry, whether it be dry, damp or painted.

It's fire retardant, chemical, moisture, and vermin resistant, and comes in three attractive colors: Brilliant White, Bright Yellow, and Pearl Gray.

Return the coupon for details on Swift's ADFINISH ADHESIVE. Ask for details on ADCOTE . . . for trowel application.

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105TH YEAR

AD-9

JUST CLIP TO LETTERHEAD AND MAIL

Swift & Company
Adhesive Products Department
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☐ Send bulletins on ADFINISH
☐ Send information on trial order
☐ Send details on ADCOTE

Name_____

FACTORY / CATALOG NEWS

Begins on page 308

For more about these items, circle item numbers on Reader Service Card next to back cover.

159—Paints. Here's a 12-page guide (No. 15-Na) for maintenance men, engineers, and contractors. It describes many types of exterior and interior paints; gives physical properties, and applications. Discusses surface preparation. *National Chemical & Mfg. Co.*

160—Safety Paints. Take a look at a five-color chart of fluorescent paints, then open the 6-page folder No. 2236 to see how "fire orange" works in the plant shown. You'll see it glows like neon when compared with the usual safety color. *Switzer Brothers, Inc.*

161—Weed Control Chemicals. If you're waging a battle with nature, this 4-color, 12-page booklet (GAC 630) may help you to victory. It describes two herbicides, Simazine and Atrazine, for round-the-calendar preventive weed control. *Geigy Agricultural Chemicals.*

162—Refractories. An 8½x11, loose-leaf notebook treats the entire subject from basic refractories to external finishes. A 6-page fold-out lists products, properties and uses at a glance. Contains charts, tables, specifications, and photos. *H. K. Porter Co.*

163—Weed Control. Cup your hands together and the amount of granules they hold controls 50 sq. ft. of weeds and grass. More information is contained in a small 6-page folder about this chemical weed killer and how it can save you money. *Chipman Chemical Co., Inc.*

164—Flooring Materials. If your floor maintenance costs are skyrocketing, Bulletin No. 659 (4 pages) will help. Photos show ways products can be used to solve tough flooring problems. Covers concrete repair, heat, and heavy-wear problems. *Walter Maguire Co.*

165—Elastomers. Are you designing a product that requires elastomeric properties? This 6-page bulletin (No. 902) gives examples

Remove Damaging OIL, WATER and DIRT from compressed air lines!

NEW WILKERSON "WHIRLFLO"

For air lines ¼" to 5" P.T. with or without pipe flanges.

Exclusive features of NEW Wilkerson "WHIRLFLO" FILTER.

★ Metal bowl or transparent bowl.
★ "Micro Pruf" cartridge completely removes oil and particles as small as 3 microns—lasts 4 times longer.
★ 200% greater CFM capacity. Maximum pressure 250 PSI with metal bowl.

Put the "WHIRLFLO'S" double-barreled action to work for you.

1. Centrifugal force from special baffle vane sends contaminants to walls of cylinder away from cartridge, from where they drain into sump.
2. Then separated air flows through "Micro-Pruf" cartridge. This 2-stage action cleans better and adds months of life to cartridge.

SAVE on maintenance and operation.
1. The cartridge lasts 4 times longer than others.
2. Cartridge is easily replaced by removing one nut while unit remains on pipe line.
3. Addition of automatic petcock eliminates human failure to drain, keeping cartridge from water level.

WRITE TODAY for complete information on the efficient, money-saving Wilkerson "Whirlflo" Filter.

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A NEW HIGH...IN VALUE
A NEW LOOK...IN STYLING
A NEW LOW ...IN PRICE

AUTOMATIC'S Gas Operated LIFT TRUCKS

VALUE PLUS—Automatic's simplified power package offers the ultimate in high operating efficiency, low cost of operation, and maximum safety. A gas engine and variable voltage generator, precisely matched, supply exact power to the electric drive motor...no clutch or hydraulic torque converter to cause trouble or worries. Here are a few of Automatic's plus value features:

- Operates on 25 to 30% less fuel
- 50% longer hydraulic pump life
- Oversize brakes last up to 30% longer and are adjustable without removing wheels
- Longer-life, advanced-design roller mounted uprights
- Ventilated exhaust dispels fumes
- New 3-way adjustable seat increases driver efficiency—reduces fatigue

MODERN STYLING—New orange and blue color combination. Automatic's new special high visibility safety orange adds another safety plus feature to your plant, while its new royal blue color accentuates the truck's low center of gravity and high stability.

THE PRICE IS RIGHT—No longer a premium-priced truck, but priced competitively with trucks which use hydraulic torque converters.

CAPACITIES: ▲
3,000 to 10,000 lbs. with cushion tires.

CAPACITIES: ▶
3,000 to 8,000 lbs. with pneumatic tires.

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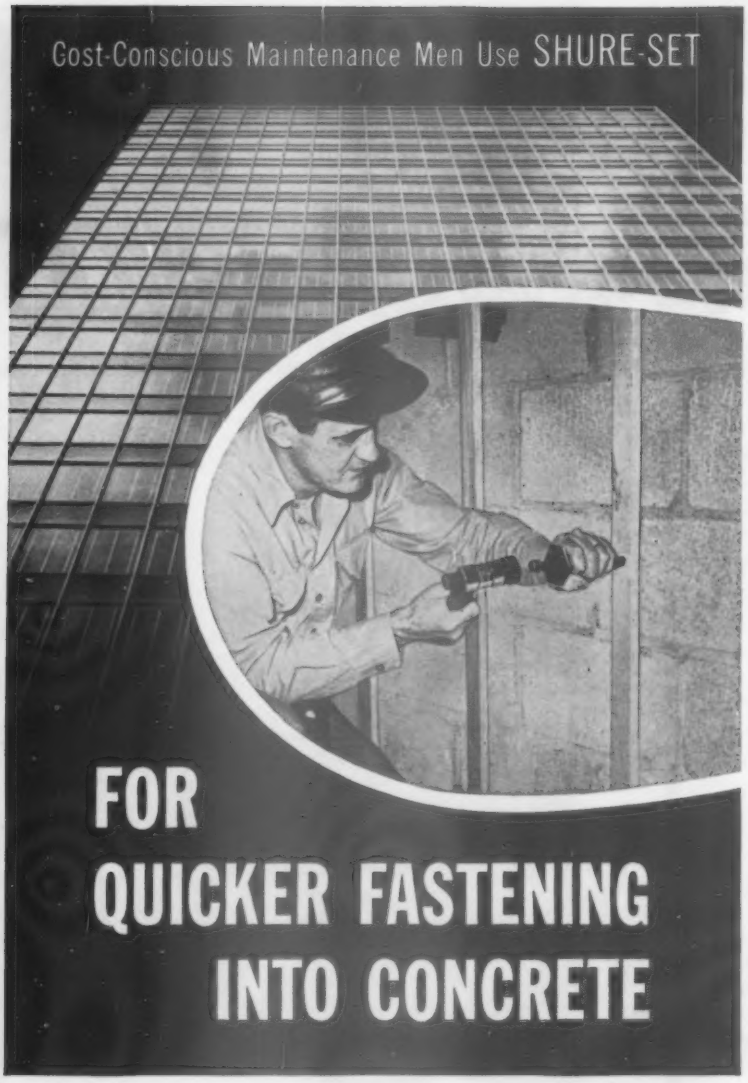

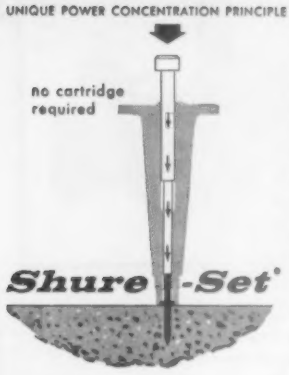

The unique "hammer-in" principle of the Shure-Set tool enables you to set threaded studs, drive pins and wire loops into concrete without muss, fuss, or waste. It is a tremendous work-and time-saver... requires no pre-drilling, filling, plugging or cartridge... just place fastener in tool, position against work face, then a few hammer blows drive fastener right through this metal or wood into concrete.

Shure-Set is simple, efficient, economical and *ten times faster* than ordinary light fastening methods. And remember Ramset for heavy-duty fastening. For your dealer's name look under "Tools" in the Yellow Pages, or write us direct for information.

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Ramset® Fastening System

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FACTORY / CATALOG NEWS

Begins on page 308

For more about these items, circle item numbers on Reader Service Card next to back cover.

of custom-built elastomers that helped turn designers' ideas into useful products. Lists properties of 10 elastomers. *Lord Mfg. Co.*

166—Plastics. Here's a 16-pager (BR-0) that outlines properties, applications, and specifications of nylon, Teflon, base resin, other industrial plastics. Has data on nylon tubing, braided hose, sintered parts, molding powders, coating materials. *The Polymer Corp.*

167—Chemicals. Want to know the physical properties of more than 400 synthetic organic chemicals? A 28-page booklet, 1960 edition, is just the reference book to keep at hand. Lists alcohols, acids, chlorine compounds, glycol-ethers. *Union Carbide Chemicals Co.*

168—Ceramic Tiles. Catalog No. 210 (32 pages) suggests many designs in tile to beautify exterior and interior plant sites. Four-color sketches show decorative effects possible with ceramic tile. Shows colors and patterns. *American Olean Tile Co., Inc.*

169—Electrical Tapes. Got tape problems? An 8-pager (No. 975) deals with friction tapes, general-purpose rubber splicing compounds, special-purpose, and plastic tapes. Lists advantages, properties, specifications. *U. S. Rubber Co.*

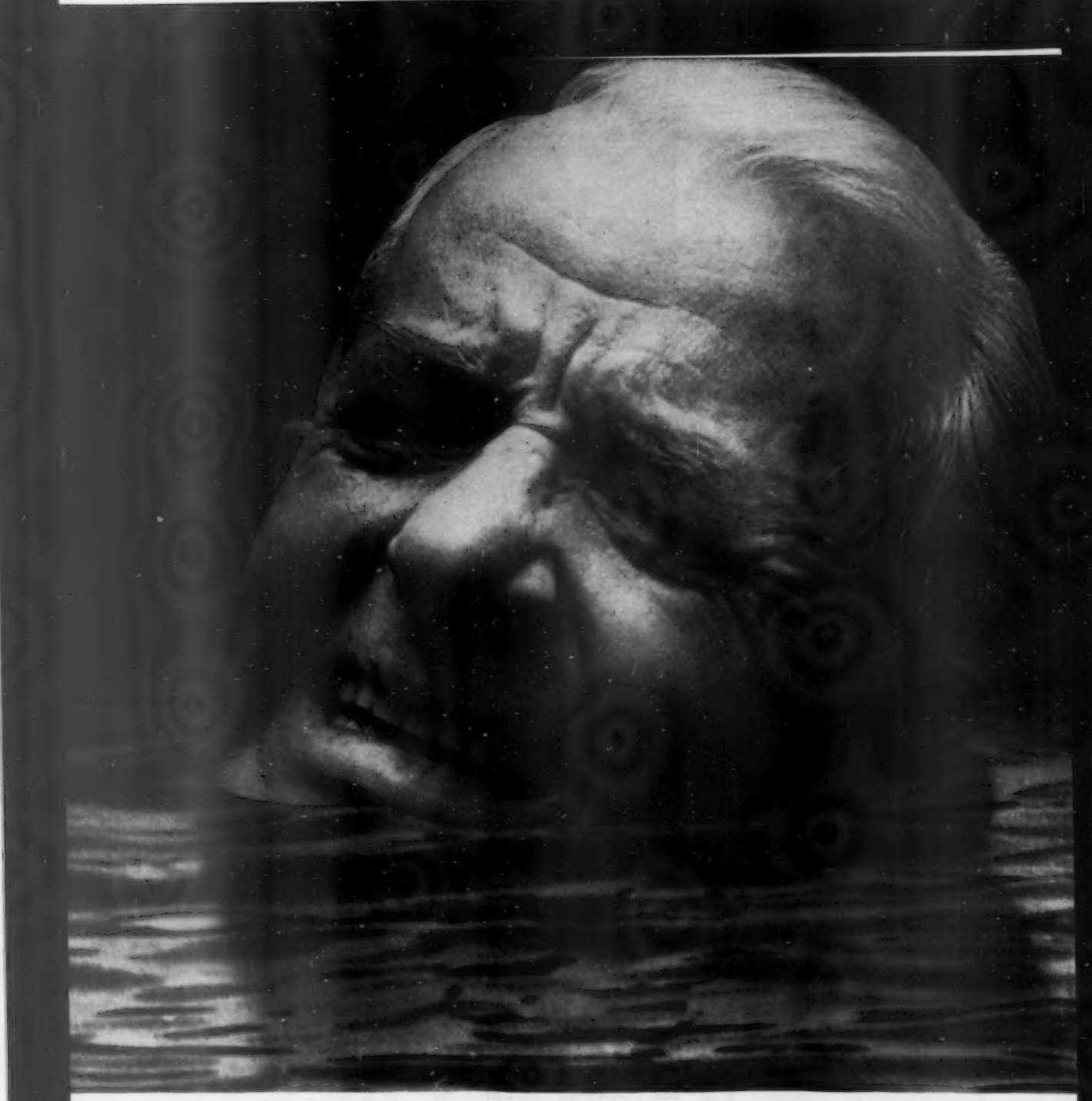
170—Flooring Materials. You'll meet the challenge of problem floors with the help of this small folder (No. P-31) that tells all about Tuf-Quik heavy-duty floor finishes. Includes specification chart and color samples of enamels. *The Wilbur & Williams Co., Inc.*

171—Spring Materials. This "Spring Materials Digest" is an 8-page handbook that discusses various properties of several groups of metals, such as copper-base, nickel-base, and stainless steel alloys. Includes comparison tables and charts. *H. K. Porter Co., Inc.*

Turn the page

For more facts Circle 885 on Reader Service Card

For more facts Circle 886 on Reader Service Card ➤



"I screamed for pump service and they sent me a salesman!"

"Every important man in the plant is raising cane with me and the manufacturer sends out a *salesman* to fix my pump! I don't want sympathy . . . I want service. I want a man who knows pumps and *fixes pumps for a living.* I need him badly . . . RIGHT NOW!"

• • •

Trained service . . . one of the inherent qualities you get when you buy Allis-Chalmers pumps. Industrial Equipment Division, **Allis-Chalmers,** *Milwaukee 1, Wisconsin.*

A-1314

ALLIS-CHALMERS GIVES TRAINED SERVICE

At Allis-Chalmers, the servicemen "service" and the salesmen sell. Factory-trained men are available in every regional office to service pumps "on the spot." Certified service shops can rebuild equipment quickly . . . save you transportation expense and time. When you call A-C for service, you get service . . . from servicemen. The quickest and best offered by any pump manufacturer.

THE BRIDGE TO *Progress* AND *Safety...*

The bridge in this picture, designed to carry both horse power and man power across the Root River, represents a step to further expansion of Western Printing and Lithographing Company facilities in Racine, Wis.

Western selected Globe's Safety GRIP-STRUT grating on this bridge for greater safety and for greater economy. Safety GRIP-STRUT is the new basic material, all in one piece (including channels), not welded, riveted or expanded, in steel or aluminum, in standard sizes and gauges. It presents an open space, in a diamond pattern, in excess of 55% of the area for a positive NON-SKID footing in all directions. It is also ideal for work platforms, stair and ladder steps, flooring, balconies, catwalks, machinery guards, fire escapes and for original equipment safety treads.

IMPORTANT SAFETY FEATURES:

Fire proof, slip proof, maximum strength, minimum weight, easy to stand and walk on, cool in summer, warm in winter.

BIG ECONOMY FEATURES:

For balconies—no extra light needed below—no extra heat. No extra supports needed—Channels are integral part of the material. No secondary sprinkler heads necessary. Self cleaning. Cut and installed like lumber by your own maintenance force. Low in original cost.

Write for new complete catalog. Distributors in all principal cities. Consult yellow pages in phone book under "GRATING".

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Begins on page 308

For more about these items, circle item numbers on Reader Service Card next to back cover.

172—Molybdenum Products. This 22-page booklet gives information on unalloyed molybdenum and Mo-0.5 Ti alloy billets, bars, plates, and sheets. Specifications for each product include scope, structure, properties, dimensions, and finish. *Universal-Cyclops Steel Corp.*

173—Aluminum Bar Stock. An extended range of sizes for hollow bar stock is listed in this 8-page brochure. In all alloys with OD to 4 in., wall thicknesses to ½ in. Includes tolerances, dimensions, and sizes in round and hexagonal rod and bar. *Harvey Aluminum.*

174—Lubricating Oil. What you should know about lubricating oils is told with charts and photographs in 18-page booklet, "New Dimensions." A 4-pager gives you the answers to lubricating problems dealing with high-speed machines. *Bardahl International Oil Corp.*

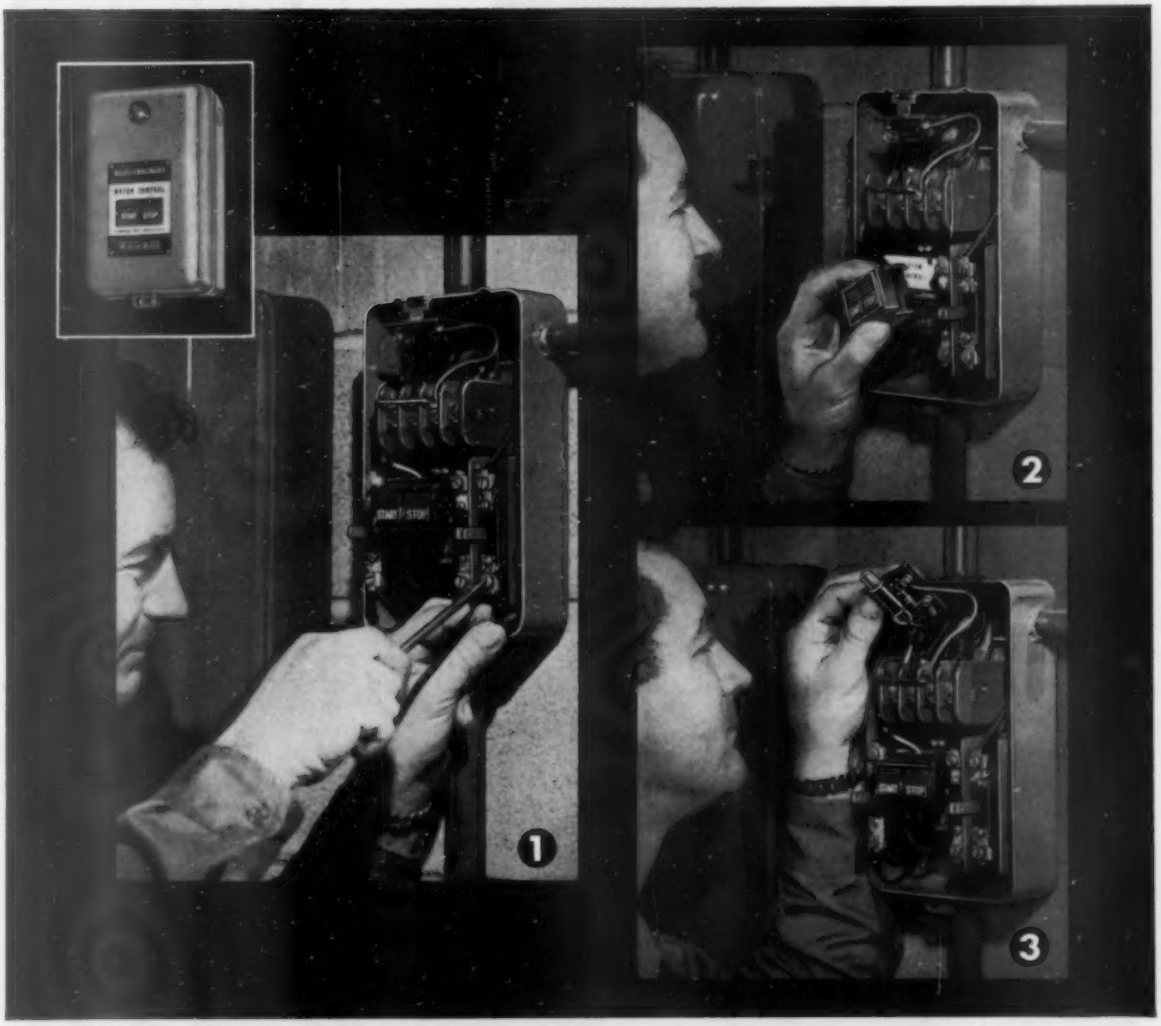
175—Flooring Materials. Four-color 4-pager (No. 12f/FL) shows styles in marbleized patterns, and gives specifications of indoor vinyl-asbestos tile. Another 4-pager shows applications of "Flintar" seal-coating for protecting asphalt pavements. *Flintkote Co.*

176—Rust Coating. Ospho is no miracle or "cure-all," says 4-page Folder No. 16, but it does stop rust action and prepares rusted metal for paint. Sketches show how you can test it yourself. Also gives applications, properties, and prices. *Rusticide Products Co.*

177—Protective Paints. This brochure outlines paint and primer specifications for tank interiors and exteriors, fire hydrants, and pumping station equipment. Handy chart tells how much paint is needed for tanks up to 1½-million-gal. capacity. *Joseph Dixon Crucible Co.*

178—Lubricating Oils. Four 4-page booklets give applications, and other information on (1) APL grease (for high-level radiation); (2) Cardium

ALLIS-CHALMERS



Flexible design for easy modification

featured in this new complete line of low voltage motor control

The modern, flexible design of this new line of Size 0 through 4 Allis-Chalmers control permits making many modifications in the field with ease. Minimum parts requirements facilitate delivery from local stock.

1. A third overload relay can be added to any Allis-Chalmers enclosure in the field, by use of just two screws.
2. Start-stop buttons and selector switch kits are "plug-in" mounted.
3. Only one pilot light kit is needed for any size starter, any standard voltage.

- Auxiliary contacts fit any size starter, 0 through 4.

Accessibility — Wide-open design permits fast installation, modification, inspection and maintenance.

Unsurpassed Mechanical and Electrical Life — Millions of "life test" operations attest to the functional quality in every detail — assure the ultimate in dependable performance and sure protection for personnel, motors and machines.

A complete line of low voltage control (Size 0 through 9) and high voltage control *in all NEMA* enclosures, plus engineered control systems. *Your A-C distributor or representative will give you all the details. Or write* **Allis-Chalmers,** *Industrial Equipment Division, Milwaukee 1, Wisconsin.* A-1282

Here's why you're money ahead

with A. O. Smith glass-protected smokestacks

- Now available in a variety of colors
- They last longer — as much as 3 to 5 times longer than unlined steel stacks — corrosion resistant regardless of excess condensate
- Glass is tough, durable — shows remarkable resistance to impact or abrasion
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FACTORY / CATALOG NEWS

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EP (extreme pressure loads); (3) MP grease (multipurpose); and (4) Alexia Oil A (large, low-speed diesels). *Shell Oil Co.*

179—Protective Coatings. Is water seeping through your plant walls? You'll find your problem solved in this 20-page catalog (No. 17). Two other folders (4 pages each) describe Thorospan—for watertight joints; and Thoropatch—for repairing damaged cement floors. *Standard Dry Wall Products, Inc.*

180—Building Wire. Synthinol 901, a polyvinyl chloride compound, and its applications in wiring are discussed in 4-page bulletin (RCP-3001). Data includes physical properties, electrical characteristics, and comparison tables of Types T and TW. *Rome Cable Corp.*

181—Building Material. For efficient, low-cost roof insulating, take a look at this 6-page bulletin (No. BU-92A). Describes applications, specifications, and properties of Roofinsul. No. TR-192A (32 pages) tells about Transite curtain wall. *Johns-Manville.*

182—Paints. A quick-reference guide (4 pages) helps you determine which finishes and primers suit your needs when painting for first time, or repainting. Describes normal and heavy-duty paints for exterior and interior uses. *Barreled Sunlight Paint Co.*

AUXILIARY

183—Boilers. Catalog 120 (12 pages) describes fully automatic horizontal Scotch Marine type boilers. Provides specifications on nine sizes of gas- and oil-fired boilers from 10 to 100 hp. and 100 or 125-lb. maximum working pressure. *Lookout Boiler & Mfg. Co.*

184—Roof Exhausters. Two 4-page bulletins: No. 60-CK covers 141 models of exhausters that have non-overloading, heavy-gage centrifugal

ALLIS-CHALMERS

Imagine! A package this small

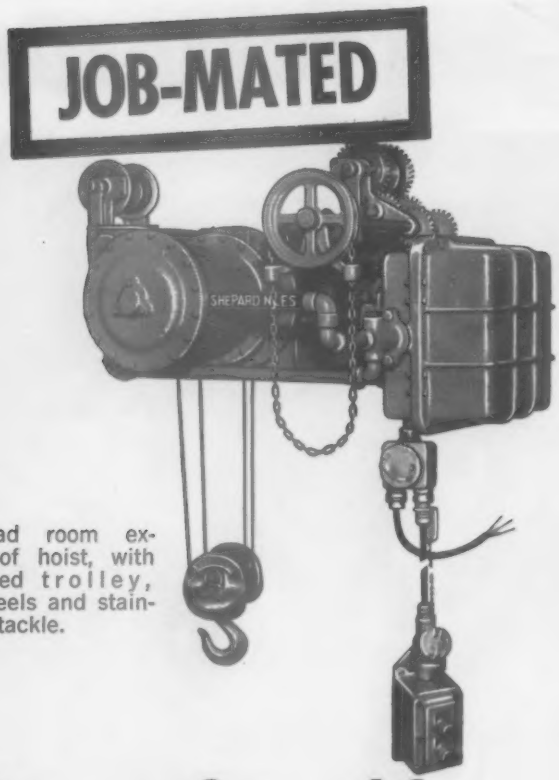
contains the spare parts for your Ro-Flo compressor

A spare parts kit you can hold in your hand — dramatic evidence of the continuous, trouble-free performance that is yours with a *Ro-Flo* compressor.

You need fewer spare parts because there are fewer moving parts to wear out. No pistons, no valves, no connecting rods. Besides the bearings and seals, which all units have, only the rotor blades are exposed to normal wear, and rotary design compensates for it — automatically, by centrifugal force. Average blade life is two to three years, and when finally worn, blades can be replaced in one simple operation.

Smooth rotary motion of the *Ro-Flo* compressor eliminates the vibration and pounding shock of reciprocating units — and the necessity for expensive, heavy foundations. A slab is enough. Smaller units can be mounted directly to the floor.

Two-stage *Ro-Flo* compressors are built in twelve sizes to handle from 250 to 1800 cfm at pressures from 60 to 125 psig. Single-stage units up to 50 psig, from 40 to 3000 cfm. *Ask your A-C representative for descriptive literature, or write* **Allis-Chalmers,** *Industrial Equipment Division, Milwaukee 1, Wisconsin.* A-1270



Close head room explosion-proof hoist, with hand geared trolley, bronze wheels and stainless steel tackle.

Give profits a lift...

with Shepard Niles JOB-MATED Hoists

It's the exact combination of capacity, clearance, speed and controls that makes this Shepard Niles Explosion Proof Hoist exactly right for your particular job. A hoist accurately matched to the job cuts handling costs, moves more materials faster, and gives longer service life.

And it's easy to match precise job conditions at Shepard Niles. With thousands of types and sizes of hoists to choose from, you are sure to find the **right** hoist for truly efficient, economical performance in your plant.

You have your choice of ¼-ton to 20-ton capacities; of floor or cab controls; motor-driven or hand-operated trolleys; regular or long lifts; and regular or close clearances. Whatever combination you choose, you get the quality construction and advanced engineering that have made Shepard Niles America's largest manufacturer of hoists and cranes.

For complete details on Shepard Niles **"Job-Mated"** hoists, write for a descriptive bulletin, or ask a Shepard Niles representative to call.

SHEPARD NILES
CRANE AND HOIST CORPORATION
3308 Schuyler Ave., Montour Falls, N.Y., U.S.A.

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Begins on page 308

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wheels. No. 60-AK lists air-moving capacities and other features of 71 axial power roof exhausters. *Jenn-Air Products Co., Inc.*

185—Natural Gas Engines. Booklet 20173 (8 pages) features three natural gas engines, and gives performance records in such applications as drill rigs, irrigation, air condition, cotton gins, pipelines, gas compression and separation. *Caterpillar Tractor Co.*

186—High-Velocity Dryers. Bulletin HV-501 (4 pages) gives technical data on three models with air outlet velocities from 15,000 to 20,000 fpm. at 800 F. or higher. Available with manual or automatic control, and temperature and volume zoning. *Midland-Ross Corp.*

187—Hydraulic Accumulators. This 4-page bulletin (1530B1) explains how and why accumulators are used in hydraulic systems, and provides data on piston-type accumulators ranging in capacity from 10-cu. in. to 10-gal. Well illustrated. *Parker-Hannifin Corp.*

188—Outdoor Heaters. Brochure CS-306 (4 pages) shows 10 examples of outdoor areas heated with infra-red units. Shows four heaters, lists heating capacities. Units operate on natural, LP, mixed, or manufactured gas. *Hupp Corp.*

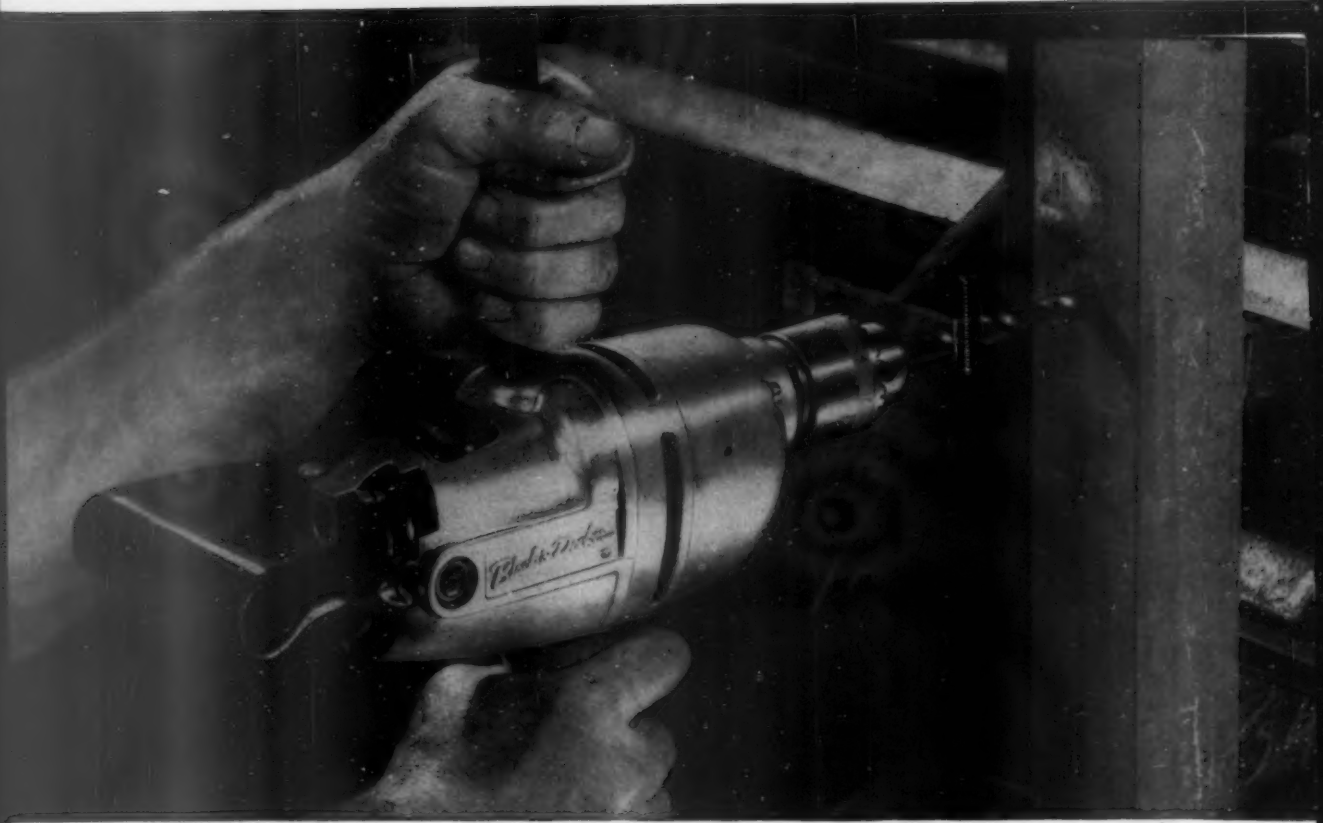
189—Power Ventilators. Bulletin RPV-1 (4 pages) gives complete specifications on Bowman's line of round power ventilators. Features include stainless steel fan blades, fully enclosed ball bearing motors, and an asbestos-asphalt coating on sheetmetal. *Bowman Steel Corp.*

190—Cooling Tower. Corrosion-proof, fibrous glass reinforced fan-stacks, laminated wood panels, oversized access panels, and fire-resistant casings are among the features of three series of cooling towers described in Bulletin 51-902. *J. F. Pritchard & Co. of Calif.*

Turn the page

For more facts Circle 892 on Reader Service Card

For more facts Circle 893 on Reader Service Card ➤



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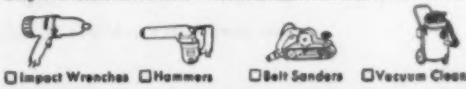

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FACTORY / CATALOG NEWS

Begins on page 308

For more about these items, circle item numbers on Reader Service Card next to back cover.

191—Air Conditioning Systems. Here's a new 16-page brochure, "Dollars Out Of The Air," that describes maker's complete line of equipment for drying, sterilizing, dehumidifying, and cooling air. Prefabricated climate control rooms are covered. *Midland-Ross Corp.*

192—Water Chillers. Extensive line for industrial and process cooling, air conditioning, etc., is discussed in Catalog 535-A. Condensers and heat exchangers are dealt with in 300B; cooling towers in 362. 570A and 571 describe air conditioners. *Acme Industries, Inc.*

193—Compressors. Series of bulletins provide data on heavy-duty compressors: No. 3250 (24 pages) covers horizontal and vertical models of 20-150 hp. No. 3150-B (24 pages) covers 125-350 hp., and No. 8298 details a 100-125 psi. centrifugal compressor. *Ingersoll-Rand.*

194—Treatment Equipment. Complete line of equipment for the treatment of water, sewage, and industrial waste is presented in Bulletin 2617 (20 pages). This well-illustrated piece includes flow diagrams of typical installations; offers special designs. *Link-Belt Co.*

195—Plastic Fittings. Chemical-resistant, maintenance-free, lightweight. These are the virtues of plastic fans, ducts, fittings, tanks, etc., discussed in Bulletin B-500. The 20-pager lists materials, equipment, custom fabrication. *Heil Process Equipment Corp.*

196—Unit Heaters. Gas, steam, and hot water heaters that provide either horizontal or vertical delivery are discussed in Bulletin UH858 (8 pages). Gives details of wide range of models with installation requirements. Includes diagrams, photos. *Grinnell Co., Inc.*

197—Radiant Heaters. Both tubular and panel heaters are described in Catalog PE-70 (14 pages). Gives helpful suggestions and discusses

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When time counts, you can count on your Tuffy distributor. Tuffy slings are factory-fitted, factory-packaged and easy to order. They are delivered to you as a complete package — ready to go to work right now.

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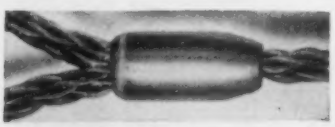
Tuffy's patented 9-part machine-braided fabric combines extra strength and toughness with extra flexibility. Kinks rarely occur. If one does, it's easily smoothed out, leaving sling undamaged.



Tuffy's pressed-on metal ferrule is applied under hydraulic pressure so great that the eye splice has the full strength of the machine-braided fabric. Another Tuffy extra at no extra cost.

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He's set up to serve you fast on every sling need, including the new Union hand-braided slings. And he's backed by his nearby Union Wire Rope depot to assure no time lost in filling orders of unusual nature or quantity.

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Safety Council Cites Factors in Lifting Injuries

The National Safety Council reports nearly a fourth of all compensation cases are the result of unsafe handling methods or conditions. The following are listed as factors contributing to handling injuries:

"(a) Handling loads that are too heavy; (b) lifting or lowering with the back muscles instead of the leg muscles; (c) handling load with an insecure grip and failing to watch where hands are placed; (d) handling without sufficient help or failing to use mechanical equipment; (e) handling before getting a firm footing; (f) lifting or lowering with a jerking, twisting movement of the body, or when the body is in an awkward position."

Maintenance Tips for Hoisting Equipment

(1) Be sure crane and hoist controls are in proper working order. Don't use equipment that hasn't been tested recently.

(2) Inspect hitching equipment before it is used. Re-check after use.

(3) Remove hitching equipment not in use from hooks, hoists and loads. Don't allow it to remain loose.

(4) Store slings systematically when they're not in use. Don't let them lie around helter-skelter. They may be damaged between lifts.

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FACTORY / CATALOG NEWS

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precautions for selection and installation. Points out special maintenance features. Drawings show assembly. *Corning Glass Works.*

198—Air Cleaners. Bulletin 76-4369 (12 pages) deals with electronic air cleaners with any of three cell designs, each with its own merits and applications. Come in both custom-packaged and field-assembled types. *Minneapolis-Honeywell.*

199—Steam Generators. Packaged steam generators are presented in Bulletins PG-59-4 (8 pages), PG-58-2 (4 pages), and B-55-4 (4 pages). A 64-page spiral-bound brochure (B-56-5) describes in detail large installations with various ratings. *Foster Wheeler Corp.*

200 — Centrifugal Refrigeration. Features of two-stage centrifugal compressors, evaporators, condensers, and complete refrigeration systems of 125 to 3500 tons are set forth in Bulletin 1100-B14B (28 pages). Covers instruments and safety controls. *Worthington Corp.*

201—Pumps. Two excellent brochures discuss several series of pumps with built-in "Q" factor. No. 975-G (24 pages) covers close-coupled single suction pumps in six classes. No. 976-H (24 pages) deals with five other classes. Tables of ratings. *Buffalo Forge Co.*

202—Air Compressors. Illustrated Bulletin No. SG-2 (12 pages) summarizes specifications and features of air compressors, auxiliary air storage tanks, and other accessories. Another bulletin (4-page S-101D) discusses six typical applications. *Westinghouse Air Brake Co.*

203—Submersible Motors. Cutaway and exploded view drawings in Bulletin F-200 (8 pages) illustrate submersible pump motors, from 5 to 300 hp. Features include water-filled operating principle as opposed to usual oil-filled. *U. S. Electrical Motors, Inc.*

Turn the page

Courtesy Davey Compressor Company, Kent, Ohio

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JOB: Tapping ¼"-20 threads in side and floor plates of portable drilling rig. Formerly used hand tapping tool. Took 5 minutes per hole. A fatiguing operation.

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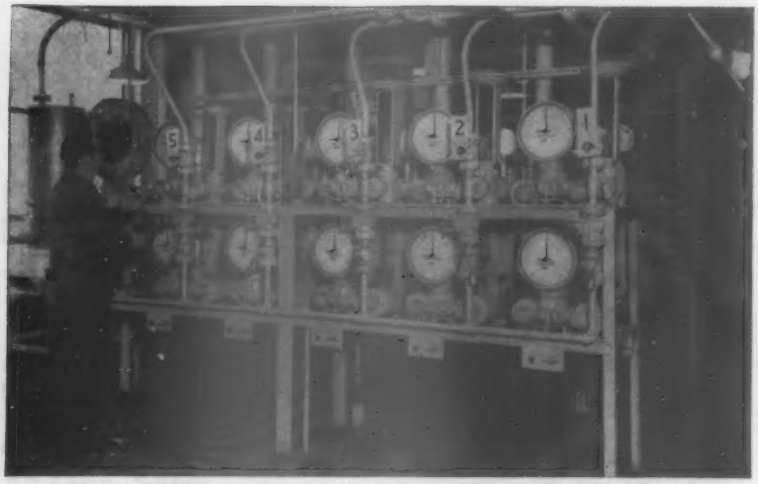

Battery of Niagara Chemical Meters measuring and controlling flow of CS_2 at Dupont's Buffalo Film Department Plant.

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Niagara Steam Jacketed Meter for materials requiring steam heat to maintain fluid condition.

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204—Vapor Collectors. Machining, oil, dust, and other industrial mists and vapors can be economically controlled by "Mistkop" collectors, according to Bulletin 622-3 (6 pages). A companion folder, No. 736, covers "Dustkop" line; lists applications. *Aget Mfg. Co.*

205—Silencers. Catalog 160 (8 pages) presents a complete line of modular silencing units of guaranteed and bonded performance. Includes detailed specifications, together with illustrations of the equipment and performance-testing laboratories. *Elof Hansson, Inc.*

206—Filters. Multiple-surface, porous stainless steel filters for a wide range of flow rates, temperatures, slurries, and pressures are described in 8-page Catalog M-208A. Engineering data are included, with typical filter-aid set-ups. *Pall Corp.*

207—Graphite Equipment. Graphite heat exchangers of various kinds, coolers, absorbers, pumps, pipe and fittings, valves, crucibles, and similar equipment are detailed in Bulletin 249-2 (29 pages). Includes cost and installation data. *Falls Industries, Inc.*

208—Water Heaters. Specifications for industrial applications of several lines of water heaters, and the sizing guides for each are set forth in Form No. SW60 (8 pages). Includes accessories, a general table of data, and NSF approval listings. *Ruud Mfg. Co.*

209—Pumps. Assortment of literature on centrifugal and motor pumps for both general and specialized service is available. Form 7062-D (16 pages) covers class GT; 7057-C deals with single-stage pumps; and 7223-B describes cradle-mounted CRV's. *Ingersoll-Rand.*

210—Fans. Bulletin A-109E contains 20 pages of information on propeller fans and blowers of 31 different types, ranging from cooling

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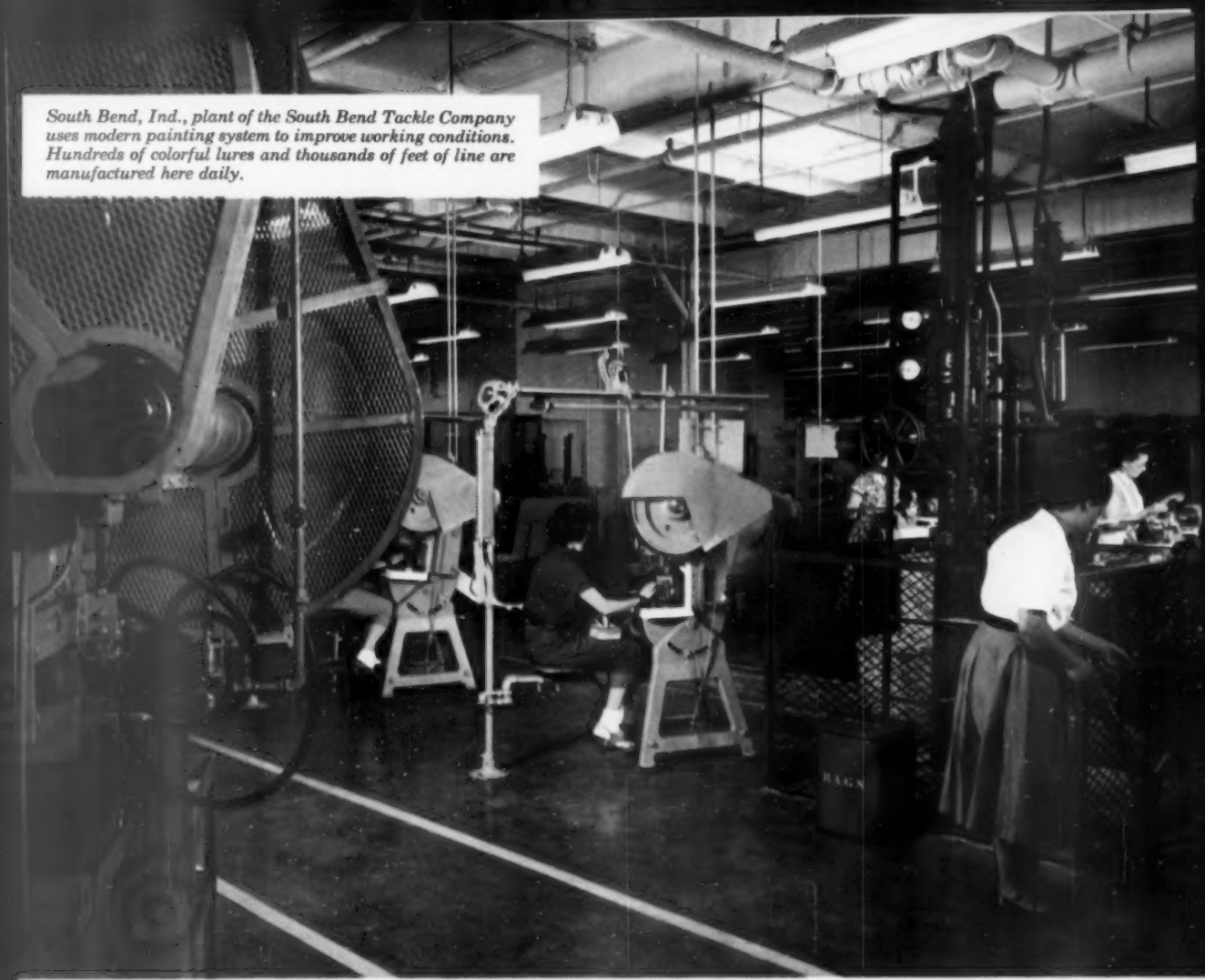

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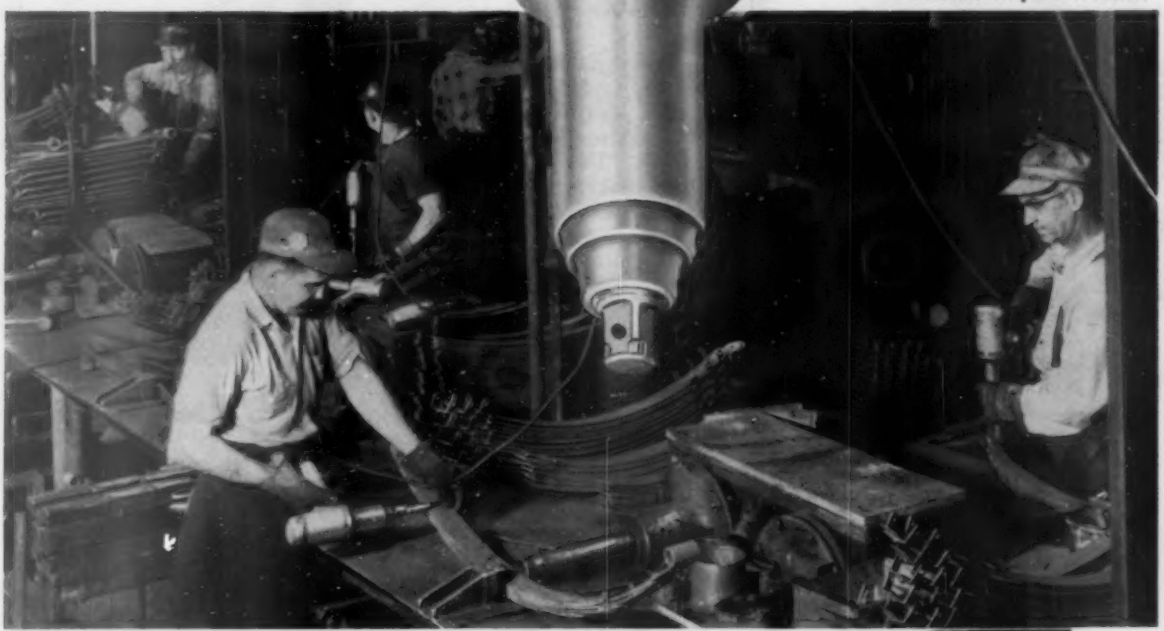

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HEAVY DUTY TOOL . . . Stands up to toughest use. Ball bearings throughout and helical gearing assure long life. Unitized motor stands vibration. Has box-type brush holders. Impact clutch prevents motor burnouts.

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and ventilating fans through unit heaters, reversible, extension shaft, and cooling tower fans. *Hartzell Propeller Fan Co.*

211—Air Handling Equipment. Remote condensing units are described in Bulletin 7017 (16 pages). No. 6011-B (20 pages) covers air handling units. No. 37 has 20 pages on air compressors from 25 to 50 hp. Dimension and installation data in each. *Dunham-Bush, Inc.*

212—Firing Equipment. Gas, oil, and coal handling equipment for automatic firing of industrial boilers are discussed and illustrated in Catalog 6260. This 12-pager covers auxiliary equipment, control panels, stokers, burners, and fuel selection. *Iron Fireman Mfg. Co.*

213—Treatment Equipment. Water, sewage, and industrial waste treatment equipment are covered by Catalog 952 (65 pages). Offerings range from feeders and collectors through grinders, screens, settling tank equipment and biofiltration devices. *Jeffrey Mfg. Co.*

214—Water Chillers. Leaving temperatures of 40 to 48 F. are obtainable with some 150 possible combinations of motor shell and compressor, according to tables in Catalog DS-399. This new 67-pager gives selection, specification, dimensional data. *The Trane Co.*

215—Unit Heaters. Catalog No. 858 (36 pages) describes and illustrates heating and ventilating units and accessories; offers selection tips. Catalog 159 (16 pages) covers unit heaters for steam and hot water systems. Rating guide and location diagram. *Modine Mfg. Co.*

216—Air Distribution Equipment. Sidewall and ceiling air diffusers, floor units, valves, and regulators are among the accessories and equipment highlighted in 8-page bulletin (F-4471-6). Specifications, diagrams, photos. *Barber-Colman Co.*

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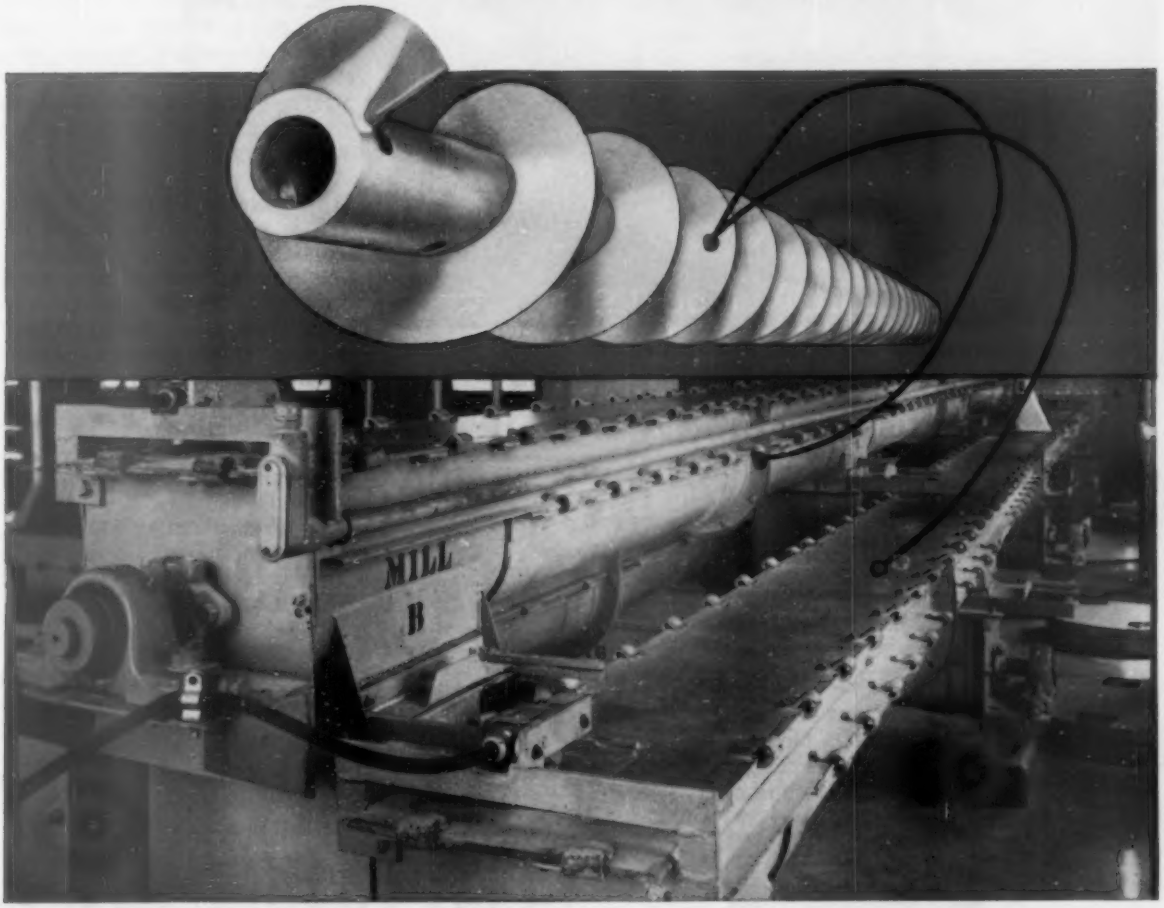

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With Link-Belt, screw conveyor engineering includes far more than just supplying a suitable product. All related aspects of your production are considered—including prior and subsequent handling, plus integration with other equipment. And because Link-Belt handles all details from specification to erection, it means a better-working system with less work for you.

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217—Heating, Cooling Coils. Pressures up to 250 psi. can be handled by platecoil heating and cooling units. Advantages include easy cleaning, low cost, less weight than pipe coil. Bulletin PD1 (8 pages) gives specifications and applications. *Tranter Mfg., Inc.*

218—Magnetic Products. Bulletin 99A is a 4-pager that briefly describes magnetic pulleys, separators, purifiers, sheet fanners, rolls, metal detectors, other equipment. Also covers plate, grate, lifting, and hand magnets. Offers laboratory service. *Indiana General Corp.*

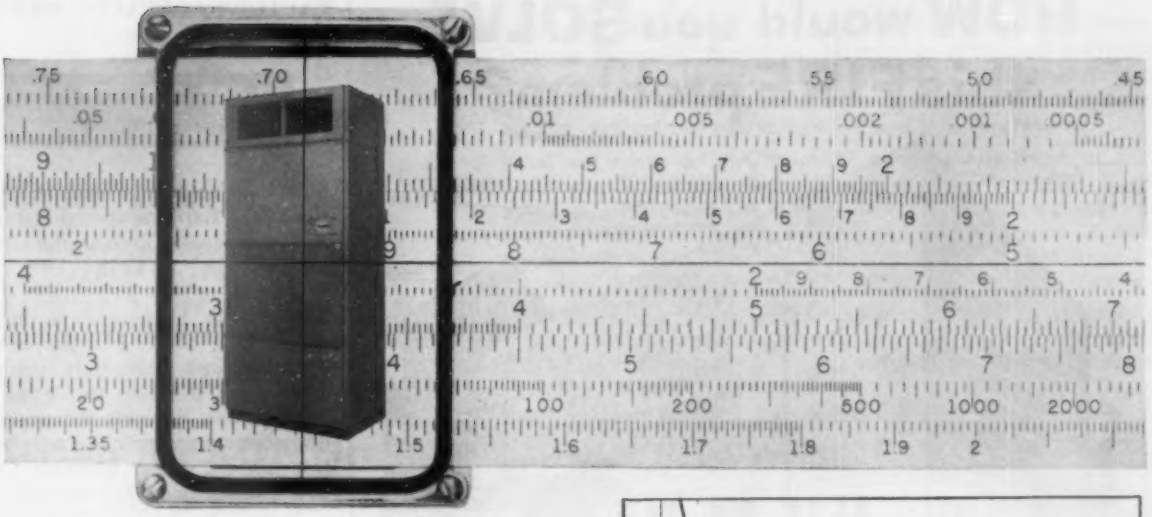
219—Deaeration Equipment. Principles of deaeration and the chemical factors involved are discussed in Bulletin N-18. This 20-pager illustrates several custom installations. Another bulletin (C-10) deals with large condensers and accessories. *Elliott Co.*

220—Coagulant Aids. Here's an 8-page brochure (HSP-919) that covers use of coagulant aids in waste water systems, process softening, brine clarification, color removal, high solids-liquid separation. Aids are polyelectrolytes and additives. *Hagan Chemicals & Controls.*

221—Cooling Towers. This handsome 28-page brochure (CT-57-1) points out the advantages of mechanical induced-draft counter-flow cooling towers. Photos of casings in redwood, asbestos cement board, concrete, brick, steel. Explains services. *Foster-Wheeler Corp.*

222—Gas-Fired Heaters. This 16-page catalog (No. JS-151P) presents five unit heaters: propeller, duct, blower, blower packages, and heavy-duty. Includes specifications, operating principles, system selection factors, application guides. *Surface Combustion Corp.*

223—Air Handling Equipment. Water chillers, all-in-one air conditioner, fan coil, and cooling and heating units are illustrated and de-



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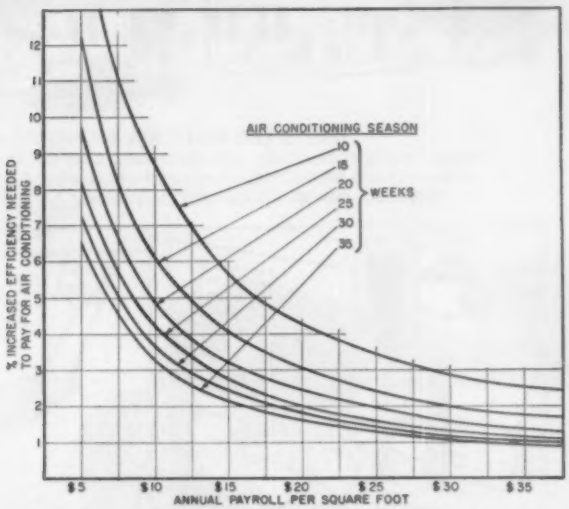

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THIS IS THE BUILDING. BIG, COSTLY...AND OLD. INSIDE, WOODEN STRUCTURE, WOODEN FLOORS. AND, TO COMPLICATE MATTERS, A FLAMMABLE PRODUCT IS MADE HERE—PAPER. DISPLAYS AND STORAGE. PROBLEM: *HOW TO INSURE FAST, DEPENDABLE DETECTION OF FIRE.*

THIS IS THE MAN. CONCERNED THAT ORDINARY PROTECTION MIGHT NOT PROVE ADEQUATE IN AN EMERGENCY, THE BUILDING MANAGER CALLED IN HIS KIDDE REPRESENTATIVE. SMART MOVE, SINCE THIS WAS A JOB FOR AN EXPERT.

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THIS IS THE ANSWER! SPECIAL PROBLEMS IN FIRE PROTECTION DEMAND THE SERVICE OF SPECIALISTS. THAT'S WHERE KIDDE COMES IN. FOR MORE THAN THIRTY-FIVE YEARS, KIDDE HAS LED THE FIELD IN FIRE DETECTION AND PROTECTION. CAN SOLVE YOUR FIRE PROBLEMS FOR YOU. *TO FIND OUT HOW—CALL OR WRITE KIDDE TODAY!*

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FACTORY / CATALOG NEWS

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scribed in an 8-page bulletin (No. LL-349). Explains special features and advantages. Gives helpful selector data. *Chrysler Corp.*

224—Pumps. Here are three single-pagers that cover a small motor mounted, and heavy-duty pumps. An 8-pager discusses two types of alloy pumps; explains the positive displacement principle and tells how to select the proper materials. All have photos. *Viking Pump Co.*

PIPES, VALVES, AND FITTINGS

225—Valves. Bulletin HB-7 (8 pages) describes on-off and throttling types. Includes section on valve sizing and flow co-efficients to aid in valve selection. Also features installation hints, schematics, and refers to other helpful bulletins. *Conoflow Corp.*

226—Control Valves. Here's a 4-page bulletin that shows how cartridge-type valves may be put inside cylinders, manifold, or even a control handle, to make valving a part of a pneumatic or hydraulic unit. Gives details on four ⅛- and ¼-in. models. *General Gas Light Co.*

227—Hose and Fittings. Catalog No. 204 has 36 pages of information on hose, adapters, couplings, cap plugs, sleeves, and tools for virtually every fluid transmission problem. Includes hose selector chart, assembly instructions with illustrations. *Aeroquip Corp.*

228—Flexible Hose. Flexible metal, rubber, and synthetic hose with suggested expansion joints and compensators are discussed in Catalog No. 188 (8 pages). Lists criteria for choosing corrugated and interlocked types. *Flexonics Corp.*

229—Valves. Whatever your need, this 28-page catalog (CD-2) on bronze, iron, cast and forged steel valves should fill it. The bulletin

Allis-Chalmers uses **RYKON** *Grease in bearing shield —offers farmers better disc harrow*

Situation: Bearings of a disc harrow in service are always turning in dusty conditions, oftentimes completely covered with soil. Such bearings in the Allis-Chalmers harrow are protected with grease-coated rubber shields. The grease guards against dirt getting past the shield and into the bearing.

What was done: Allis-Chalmers project engineer in the LaCrosse, Wisconsin plant, Maynard Walberg, called Fred Parkinson, Standard Oil lubrication specialist, for a sample of RYKON Grease. In conditions simulating field service, RYKON Grease was tested. Bearings were rotated in the most abrasive dirt available—Mississippi sand with a high quartz fraction.

What happened: Tests were started and run to destruction. Prior to the use of RYKON Grease, bearing failures occurred at 500 hours. On switching to RYKON Grease, these tests were pushed to 2,000 hours. At this point, tests were stopped. Bearings were still in operating condition.

What you can do: Find out how RYKON Grease might help you offer your customers a better product. Inquire of the Standard Oil lubrication specialist nearest you anywhere in the 15 Midwest or Rocky Mountain states. Or write **Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.**

Can RYKON Grease help you improve your product?

You expect more from **STANDARD** *and you get it!*

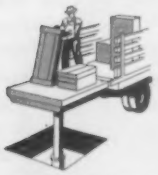
Maynard Walberg, Allis-Chalmers project engineer, and Standard Oil lubrication specialist Fred Parkinson, examine disc harrow bearing assembly. Fred is well equipped through training and experience to help industrial customers with lubrication problems. He has been doing this work for 11 years at Standard. He has a degree in chemistry and engineering from Brown University. Plus that, he has completed the Standard Oil Sales Engineering School.

Quick facts about RYKON Grease

- Heat stable. At sustained high temperatures RYKON Grease remains soft and grease-like.
- Resistant to water-washing.
- Mechanically stable. Minimum change in consistency in service.
- Resistant to oxidation. Thickener acts as an inhibitor.
- Exceptional rust-preventive properties.

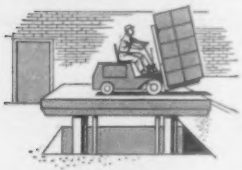
Low-cost way to load or lift

HYDRAULIC POWER HAS MANY USES IN MODERN INDUSTRY



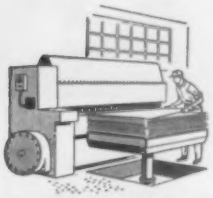
No loading dock needed

The Rotary Levelator Lift loads trucks from plant floor level, becomes part of floor when not in use. Economical, dependable oil-hydraulic operation.



Speed plant traffic

Move materials from one floor level to another on this heavy-duty hydraulic lift. Eliminates detours, saves space required for long ramps, and increases plant safety.



Efficient machine feeding

Keeping materials at convenient working level is just another use for versatile Rotary Levelator Lifts. Automatic controls speed operations, save on manpower required.

Rotary Oildraulic Levelator Lifts have countless applications in modern industry. Standard 6,000 and 12,000-lb. models are adaptable to many installations, special lifts with capacities to 300,000 lbs. or more can be engineered to your specifications. Mail coupon for more information.

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FACTORY / CATALOG NEWS

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includes dimensional and comparison charts, list of accessories, and a key to abbreviations. Photos, diagrams. *The Ohio Injector Co.*

230—Valves, Hydrants. Catalog No. 78 (hard-bound) has 175 pages of data on bronze gate, globe and angle, and check valves, and other items. Easy-to-use indexes of information, illustrations of combinations and assemblies, accessories. *The Kennedy Valve Mfg. Co.*

231—Fittings, Flanges. Two well-illustrated bulletins: No. 414A (44 pages) covers corrosion-resistant welding fittings of stainless steel, Monel, nickel. No. 415 (50 pages) shows butt-weld fittings and flanges cold-formed from forged or wrought aluminum. *Flowline Corp.*

232—Steam Hose. This 4-pager describes flexible hose specially designed for steam transmission. It uses an extruded Teflon inner core, pure bronze wire braid reinforcement, and solid brass swaged fittings to counteract any damage from the live steam. *Titeflex, Inc.*

233—Regulators, Valves. Sliding gate regulators and control valves in ductile iron are discussed in 4-pager (J-DI). Explains how ductile iron can replace steel in many applications at lower cost. Shows sliding gate seats, other fittings, assemblies. *OPW-Jordan.*

234—Hose Clamps, Tools. Catalog No. 300 (12 pages) covers clamps and clamping tools, grooved hose fittings. Describes the mechanical clamping method used for connecting various fittings, ordinary pipe. Lists applications. *Punch-Lok Co.*

235—Plug Valves. This 6-pager (V/12) tells about low-cost valves with Teflon sleeves that provide positive shut-off with no sticking, no galling, no lubrication. In ductile iron or 316 stainless steel, sizes ½ to 2 in., flanged or screwed ends. *The Duriron Co., Inc.*

Turn the page

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A HIGH QUALITY LINE OF MALLEABLE HOUSED BEARING UNITS AND BEARINGS AT A COST THAT IS WARRANTED ON YOUR MACHINE!

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Available in pillow blocks and two or three bolt flange units for flush or recessed mounting. All units in the "L" Series available with the new SEALMASTER contact type seal.

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LF FLANGE UNIT

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WRITE FOR BULLETIN 359

SEALMASTER

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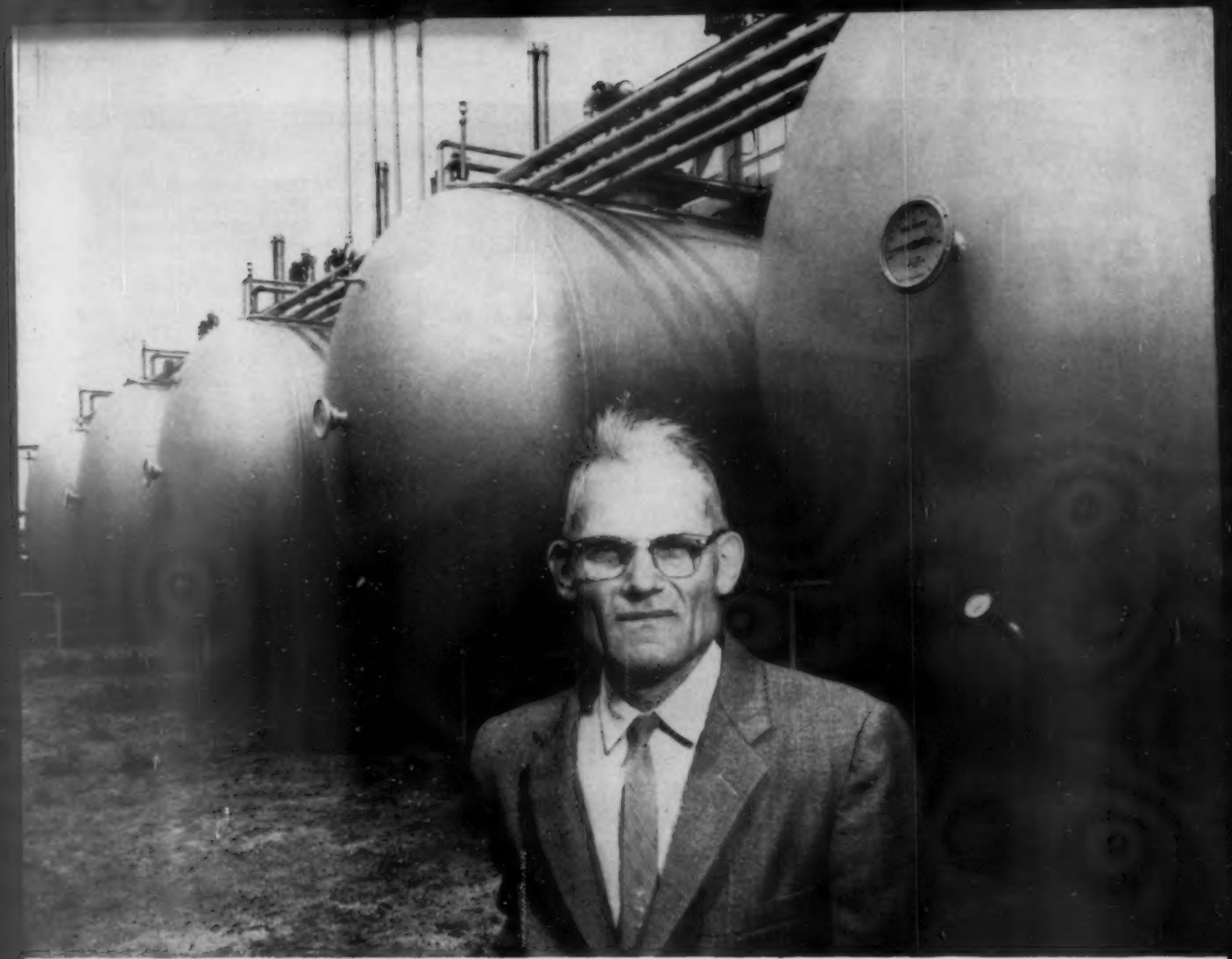

Mr. D. A. Ionata of Providence Gas Company says:

"Protective-reflective Bitumastic Coatings keep our propane tanks rust-free and cool"

"Some skeptics said it couldn't be done," says Mr. Ionata. "That is, that we could have the corrosion protection of Bitumastic® No. 50 and still get a heat-reflective top coating to keep our propane tank pressures down."

The Providence utility's Assistant Superintendent of Manufacture was faced with this problem when banded mortar over Bitumastic-coated tanks failed. Determined not to lose the still-sound protection of the Bitumastic No. 50, Mr. Ionata followed Koppers recommendation on recoating the tanks. A coating of Bituplastic® No. 28 over the Bitumastic base and a top coating of Bitugloss® Aluminum Paint was the result.

Although water sprays are installed to cool the tanks, their use has not been required since the Bitugloss coating was applied more than a year ago.

This case is typical of the problem-solving abilities of Bitumastic Coatings. Have you checked into the economies of the Bitumastic Method of corrosion-prevention? It will pay you to: write Koppers Company, Inc., Tar Products Division, Pittsburgh 19, Pa., or use the handy coupon below. District Offices: Boston, Chicago, Los Angeles, New York, Pittsburgh and Woodward (Birmingham), Ala. In Canada: Koppers Products, Ltd., Toronto.

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Request descriptive sheet on air jet cleaners, compressed air powered.

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FACTORY / CATALOG NEWS

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236—Hose, Fittings, Tools. Here's a comprehensive spiral-bound catalog (No. C-300) with 130 pages of description, tables, diagrams, photos. Includes hose and hose ends, brass and steel tube fittings, hose and tube working tools, special products. *The Weatherhead Co.*

237—Unions. What makes a good union? Answer is in this 4-page bulletin on hydro and other types of unions. Gives details of sizes, materials, ratings, and other features. All are rust-proofed, spark-proofed, and permanently lubricated. Photos. *Clayton Mark & Co.*

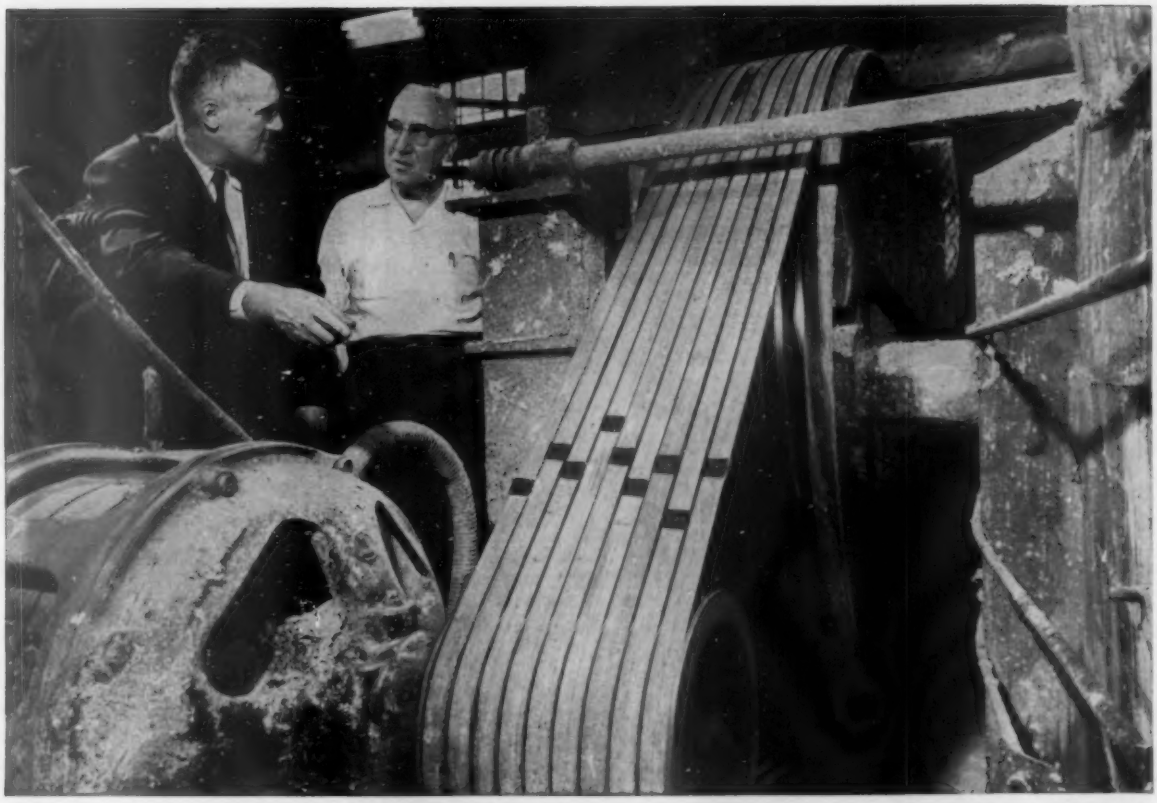
238—Diaphragm Valves. Bulletin sv5-58 (8 pages) discusses the advantages of these conventional weir-type valves. Describes design, operation, flexibility of assembly, and low-cost maintenance. Lists materials, service ratings, special products. *Grinnell Co., Inc.*

239—Steel Tubing. Carbon and alloy steel seamless and carbon steel electric welded tubing are covered in 8-page brochure (CS-60). Discusses mechanical, pressure, and airframe categories. Has section on fabrication and forging into tubular parts. *Copperweld Steel Co.*

240—Valves. Catalog KS-1-M has 20 loose-leaf pages that describe and illustrate gate, globe, angle, check, pipeline, shut-off, general-purpose valves. A 4-pager (KS-1-N) tells about needle valves (various constructions), and other general-purpose valves. *Kerotest Mfg. Co.*

241—Drainline. Bulletin PE-30 offers 12 pages about Pyrex brand lifetime drainline system that's guaranteed against corrosion and leakage for the life of a building in which it is installed. Gives details about Teflon joints, hanging, fittings, etc. *Corning Glass Works.*

242—Flexible Connectors. Advantages of Teflon hose assemblies are pointed out in these 20 pages. Bulletin TC-101 also covers such features



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New Dayton BLUE RIBBON® V-Belts

Now, you can increase production, reduce downtime and cut operating costs all at the same time by installing the new *Dayton Blue-Ribbon Thorobred V-Belts.* These new Dayton V-Belts provide outstanding service on all Industrial drives. In fact, performance which previously would have been considered *"outstanding"* is now *standard* with the Blue Ribbon Line.

Here's the key to this increased performance . . . longer life

• **Now, Blue Ribbon V-Belt** power transmission ratings are increased 40% over previously rated standard belts. New super-strength, synthetic cords absorb machine killing shock loads and vibration . . . protect machinery . . . prolong belt life.

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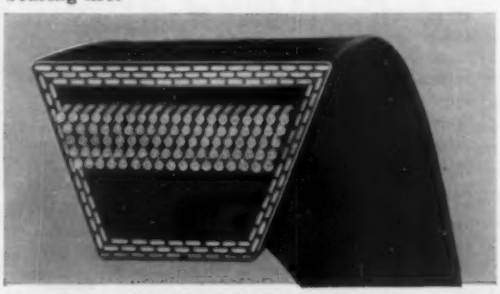
• **Extreme length stability** and precise manufacturing mean that belts can now be ordered in perfectly matched sets. Thus each belt pulls its share of the load increasing drive performance and bearing life.



Blue Ribbon Thorobred V-Belts will fit all standard sheaves. This will enable your *present* drives to handle heavier loads or more power.

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as heat and weather resistance, fatigue life, chemical inertness, etc. Specifications, diagrams, photos. *The American Brass Co.*

243—Valves. Here's a slim leaflet (Catalog V-6) with 12 pages of information on iron and bronze gate, globe, and check valves for heating, piping, and air conditioning. Gives capacity and rating for each valve; lists applications. Photographs. *The Fairbanks Co.*

ELECTRICAL

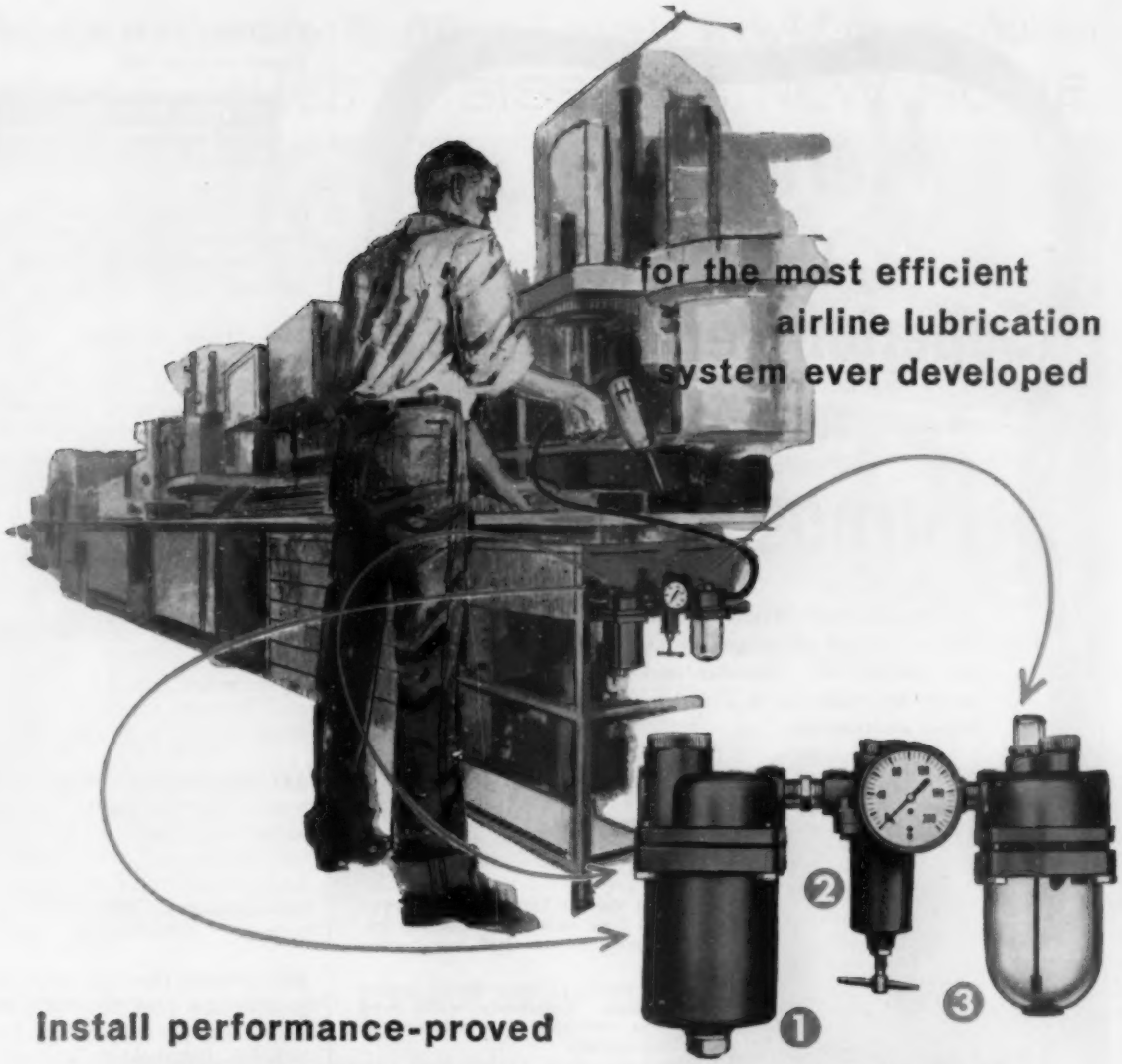
244—Lighting Fixtures. This loose-leaf 78-pager illustrates line of fixtures for incandescent, fluorescent, and mercury vapor-type lamps. Both indoor and outdoor units. Information on light distribution. Product sections are tab-indexed. *Franklin Research Corp.*

245 — Motor Controls. Catalog GEC-1260D (72 pages) is a well-organized illustrated summary of company's complete line of controls, starters, relays, pushbuttons, solenoids, switches, and accessories. Includes helpful horsepower selection chart. *General Electric Co.*

246—Electric Controls. Construction and application information on clutch and brake power supplies for fractional and integral horsepower constant speed motors is presented in Brochure P-75 (8 pages). Standard and custom-built units are both available. *Warner Electric Brake & Clutch Co.*

247—Motors and Relays. Quick Reference File F-9765 (4 pages) summarizes d-c and a-c low horsepower motors available for special-purpose drives. Covers shaded pole, permanent magnet, geared and special types. Lists polarized ultra-sensitive relays. *Barber-Colman Co.*

248 — Distribution Transformers. Here's a hard-cover loose-leaf binder that contains 30 pages of diagrams, electrical specifications, dimensions



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Complete Alemite package assures cleanest, driest, best-regulated lubrication of air tools, air cylinders, air motors, and many other types of air-operated equipment. Specifically designed for extensive service life and peak efficiency under adverse operating conditions!

1 Automatic Water Separator. Removes all of condensate, all the time. Traps dirt particles to prevent damage to sensitive airline devices. Handles all airline pressure up to 200 PSI and flow volume from 5 to 50 CFM.

2 New Air Regulator with Gauge. Assures accurately controlled air—prevents erratic operation and damage to equipment. Design permits inlet pressures of 250 PSI—adjustments up to 125 PSI. Excess air pressure "bleeds off," within regulator, instantly.

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of dry type, wall and floor mounted transformers. Available in single- and three-phase; up to 75 kva. *Jefferson Electric Co.*

249—Motor, Rectifiers. This 28-page catalog (No. 108-60) describes geared and non-geared electric motors from 1/2000 to 25 hp. Speeds range from 0.65 to 10,000 rpm. Lists variable speed control auxiliaries and other equipment. *B & B Electric Motor Co.*

250—Wiring Devices. Over 1500 types of switches, sockets, fuses, connectors, and adapters for light- and heavy-duty uses are listed in 1959-1960 Catalog (84 pages). Products are grouped in categories and indexed for easy reference. *Eagle Electric Mfg. Co., Inc.*

251—Gearmotors. Catalog No. 51B9172A (8 pages) shows all variations of speed reducing motors for heavy duty. Describes four basic designs, plus accessories and modifications. Covers other speed reducers. *Allis-Chalmers Mfg. Co.*

252—Wiring Devices. Here's an 80-page catalog (No. 60) that presents wide line of low-voltage outlets, switches, lampholders, adapters, for indoor and outdoor use. Includes portable and stationary equipment. Handy list of electrical symbols. *Pass & Seymour, Inc.*

253—Fuses. This 24-pager (SPD59) is an easy-to-understand handbook for selecting protection devices. Based on the 1959 National Electrical Code, it shows wire sizes, voltage drop for various motor and appliance loads—for both a-c and d-c. *McGraw-Edison Co.*

254—Cables. Two bulletins: No. RCP100 (6 pages) describes electrical wire, cable, and conduit line. No. RCP730 (12 pages) discusses three-conductor interlocked armored power cables for 600- to 15,000-volt service. Details on terminations, etc. *Rome Cable Corp.*

Turn the page

Founder Melville R. Bissell surely would have chosen *JENKINS VALVES for* BISSELL's NEW HOME

THE $3,500,000 PLANT OWNED BY BISSELL, INC., GRAND RAPIDS, MICHIGAN, IS AS LONG AS 3 FOOTBALL FIELDS.
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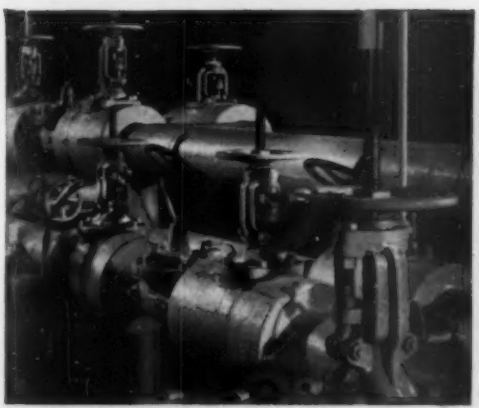
BISSELL Inc.
A Fair Offer
If you will put a Jenkins Valve, recommended for your particular service, on the worst place you can find — where you cannot keep other valves tight — and if it is not perfectly tight or it does not hold steam, oil, acids, water or other fluids longer than any other valve, you may return it and your money will be refunded.
Jenkins Bros

Almost a century ago two men established different kinds of businesses, one to make a revolutionary carpet sweeper and the other to produce the first valves with a renewable seat. Both of these pioneers began with the same firm determination: To make the finest product of its kind, so reliable that it could safely be backed by the strongest kind of written assurance of satisfaction.

The companies founded by Melville R. Bissell and by Nathaniel Jenkins still operate under that same high principle. Their names have become the most trusted in their markets.

Just as housewives seeking the best in cleaning products demand BISSELL, plant and building owners, architects, engineers and contractors wanting maximum reliability in valves commonly specify JENKINS. Valves for practically every need are made by Jenkins Bros., 100 Park Ave., New York 17.

Sold Through Leading Distributors Everywhere



Bissell's valve installation employs 748 Jenkins Valves of bronze and iron, sizes from ½" to 12".

JENKINS
LOOK FOR THE JENKINS DIAMOND
VALVES
JENKINS SINCE 1864
Jenkins Bros

Difficult Riveting Problems Easily Solved By The . . .

New T-J HYDRAULIC DUAL RIVITOR

With Increased

Riveting Production • Quality • Versatility

Added recently to the versatile T-J line of unit and production line riveting and clinching machines is the new Hydraulic Dual Rivitor. The Model HDR will set two ¼″ solid steel rivets at once with adjustable spacing from 1½″ to 18″ maximum, center to center, being fed from 10″ hoppers. Operating cycle is approximately .8 second, at 420 P.S.I. oil pressure furnished from a hydraulic power unit with maximum of 1000 P.S.I. output. For complete specifications write to The Tomkins-Johnson Co., 2425 W. Michigan Ave., Jackson, Michigan for Bulletin HDR-4-59.

For information on other T-J Rivitors and Clinchors write for Bulletin No. 555.

T-J TOMKINS-JOHNSON

RIVITORS . . . AIR AND HYDRAULIC CYLINDERS . . . CUTTERS . . . CLINCHORS

FACTORY / CATALOG NEWS

Begins on page 308

For more about these items, circle item numbers on Reader Service Card next to back cover.

255—Portable Cords and Cables. Data and insulation and jacket compounds for single- to four-conductor cables are contained in comprehensive Manual No. KW-915 (52 pages). Gives procedures for splicing and patching cables. *Kaiser Aluminum & Chemical Sales, Inc.*

256—Cable Tray. Catalog 5912 (28 pages) shows photos and dimensions of interchangeable ladder and basket-type trays and fittings. In widths from 3 to 24 in., trays are designed for economical support of electrical, communication, and hydraulic lines. *The Globe Co.*

257—Lighting Fixtures. Series of catalog sheets (SPEC 20-29) give dimensions, light output curves, coefficients of utilization for line of industrial fluorescent, mercury vapor, incandescent lamps. Accessories for each type of fixture are illustrated. *Wakefield Co.*

258—Battery Chargers. Brochure (90.41-5) shows silicon diode chargers for standby batteries in substation, emergency lighting, communication service. Wall- and floor-mounted units; 5 to 124 cells, 1 to 100 amp., d-c output. *The Electric Storage Battery Co.*

259—Underfloor Raceway. This 4-page brochure (No. 692) lists fittings and accessories covering complete line of all-steel ducts for burial in concrete floors. For power, light, communication conductors. *H. K. Porter Co., Inc.*

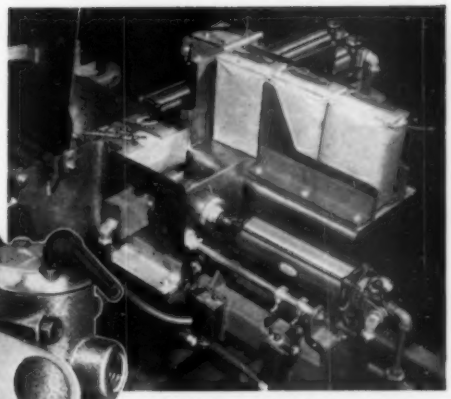
260—Cables. Complete tabulation of data on wide range of building wire, power and welding cables is contained in 52-pager (WC-859). Available in underground, weatherproof, ozone, gasoline-resistant insulations. Selection charts, application photos. *Walker Bros.*

261—Power Supplies. This 32-page handbook and catalog includes technical data that explains need for and characteristics of fast-acting a-c

Turn to page 394

with the

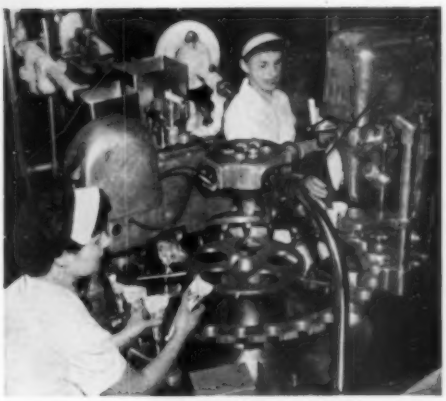
BELLOWS AIR MOTOR®



Packaging coffee is simplified by this Bellows Air Motor powered equipment.

...you can build special machines ...or modernize existing machines *at low cost and quickly!*

With parts normally available in every tool room, plus one or more Bellows Air Motors, and a little creative ingenuity, you can "spot modernize" scores of operations whose high cost whittles away at profits. The few illustrated here are typical of hundreds we can show you. The chances are good that no matter what you make, nor how you make it, this versatile air cylinder, with its *built-in* electrically controlled valve, can lend a mighty important helping hand to your cost reduction program.

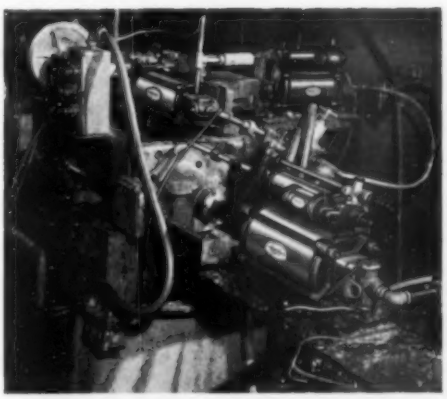


Bellows Air Motors fill ice cream, add nuts and fudge, fold and seal the wrapper in this special machine.

THIS FREE "SPOT-A-MATION FILE" MAY SPARK AN IDEA IN YOUR MIND THAT CAN MEAN IMPORTANT COST SAVINGS

A note on your letterhead addressed to Dept. FA-560, The Bellows Co., Akron 9, Ohio, will bring you basic data: wiring diagrams, installation details, equipment list, on a score of "everyday" operations almost every industry uses—and, if you wish, the services of a Bellows Field Engineer, to help you adapt those ideas to your specific needs.

1313-B



Tail stock, tool bit, and cross-slide are moved by Bellows Air Motors in this lathe conversion.

The Bellows Co.

DIVISION OF INTERNATIONAL BASIC ECONOMY CORPORATION (IBEC)

AKRON 9, OHIO

OTHER INDUSTRIAL DIVISIONS OF IBEC: Sinclair-Collins Valve Co., Valvair, Akron, Ohio • V. D. Anderson Co., Cleveland, Ohio

For more facts circle 920 on Reader Service Card

For more facts circle 757 for Strapping, 758 for Stitching; 759 for Framing→

ACME STEEL idea leader

strapping,
stitching,
framing—

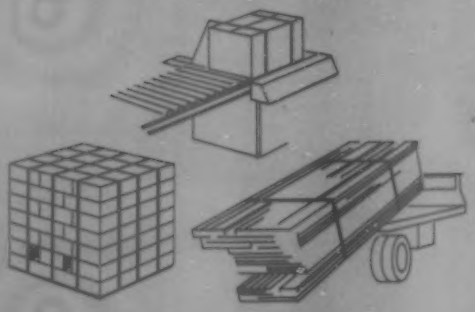
three target areas for cost reduction throughout industry. Here's how Acme Steel, one of the nation's major specialty steel companies, is leading the way . . .

IDEAS for mechanization of closing, bundling, baling, bracing, unitizing, tying and reinforcing

How long is a production line? Today it doesn't stop with the finished product. *Packaging and shipping* must also be considered part of the manufacturing process.

To secure, protect and unitize shipments, no system has so much to offer as Acme Steel Strapping. Powerful, lightweight straps bind even the most complex shapes. A wide variety of strapping machines and tools—automatically or manually operated—meet the special requirements of any installation.

No less important is the service offered by your Acme Idea Man. He has a drawing account on the industry's richest fund of experience. Chances are he's successfully answered many a problem like yours. Look to the leader—call your Acme Idea Man.



ACME STEEL **IDEA LEADER IN STRAPPING**

ACME STEEL COMPANY
13511 Perry Avenue, Chicago 27, Illinois

in . . . . .
STRAPPING

ACME STEEL idea leader

strapping, stitching, framing—

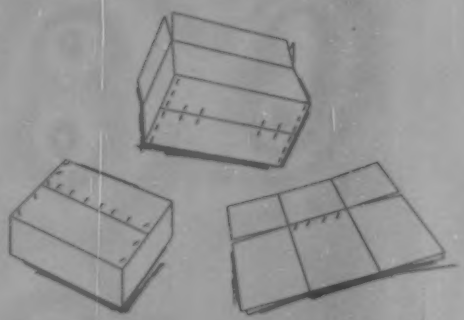
three target areas for cost reduction throughout industry. Here's how Acme Steel, one of the nation's major specialty steel companies, is leading the way . . .

IDEAS for handling closure and fastening jobs with machine-gun efficiency

Of all the closure methods used by industry, no other meets the combination of talents that belong to wire stitching. Using coils of rust-resistant wire, high-speed machines cut and drive thousands of stitches without reloading. In speed, cost-per-closure and reliability, this method is superior to tape, glue or staples.

Acme Steel's leadership in this field extends not only to stitching wire but to machines as well. Whether it's book binding, box closure or product assembly fastening—Acme Steel's 80-year background in closure methods holds the answer.

Have you a closure or fastening problem that refuses to be licked? Look to the leader—call your Acme Idea Man.



ACME STEEL IDEA LEADER IN **STITCHING**

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STITCHING

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strapping, stitching, framing–

three target areas for cost reduction throughout industry. Here's how Acme Steel, one of the nation's major specialty steel companies, is leading the way . . .

IDEAS for building structures and equipment fast and easy with unskilled labor

Any man can expertly put together AIM Brand Slotted Angle. Use this versatile framing material to build scores of structures that every plant needs—from simple storage racks to complex cages and engineered mezzanines.

AIM Brand is made of galvanized, cold-reduced steel that's bolted together after a simple cutting operation. Precision-spaced holes, in a special pattern, offer maximum fastening versatility without sacrificing strength. And its ⅜" heat-treated, galvanized bolts have full-load shoulders and 2000 pounds safety load capacity.

Acme Steel offers you more in every way: proved design; practical in-use ideas; engineering assistance for special applications; convenient local stocks. Look to the leader —call your AIM Brand distributor.

ACME STEEL IDEA LEADER IN FRAMING

AIM BRAND

ACME STEEL COMPANY
13511 Perry Avenue, Chicago 27, Illinois

in ....
FRAMING

Invincible draws used coolant from turret lathe into swivel-wheeled auxiliary tank. Especially designed for handling liquids in volume, tank is equipped with air diffuser, automatic shut-off and discharge valve.

INVINCIBLE VACUUM UNITS

Clean Machine Sumps Quick

Use Invincible vacuum equipment to remove the accumulated liquid, chips and dirt from machine coolant tanks and sumps. Eliminate mess—and do the job in ⅓rd the time.

At Great Lakes Manufacturing Corp., Cleveland, Ohio, the Invincible pictured services 17 major machines—turret lathes, grinders, and drill presses—plus a number of small machines.

All the maintenance man does is wheel the Invincible and auxiliary tank to each machine. He inserts the vacuum hose in the sump. Powerful vacuum draws out liquid, chips and sludge, depositing the mixture in the 55-gallon auxiliary tank. Average time per machine: 5 minutes instead of the 15 formerly required.

With Invincible, there's no need to remove highly inaccessible drain plugs . . . no need to handle messy drip pans (often 4 or 5 times per machine) . . . no need to hand-scoop slimy residue that remains after conventional draining.

And the Invincible also serves 2 to 3 hours a day as a vacuum cleaner, keeping shop, dock and office floors clean.

CHECK THE MANY USES FOR INVINCIBLES

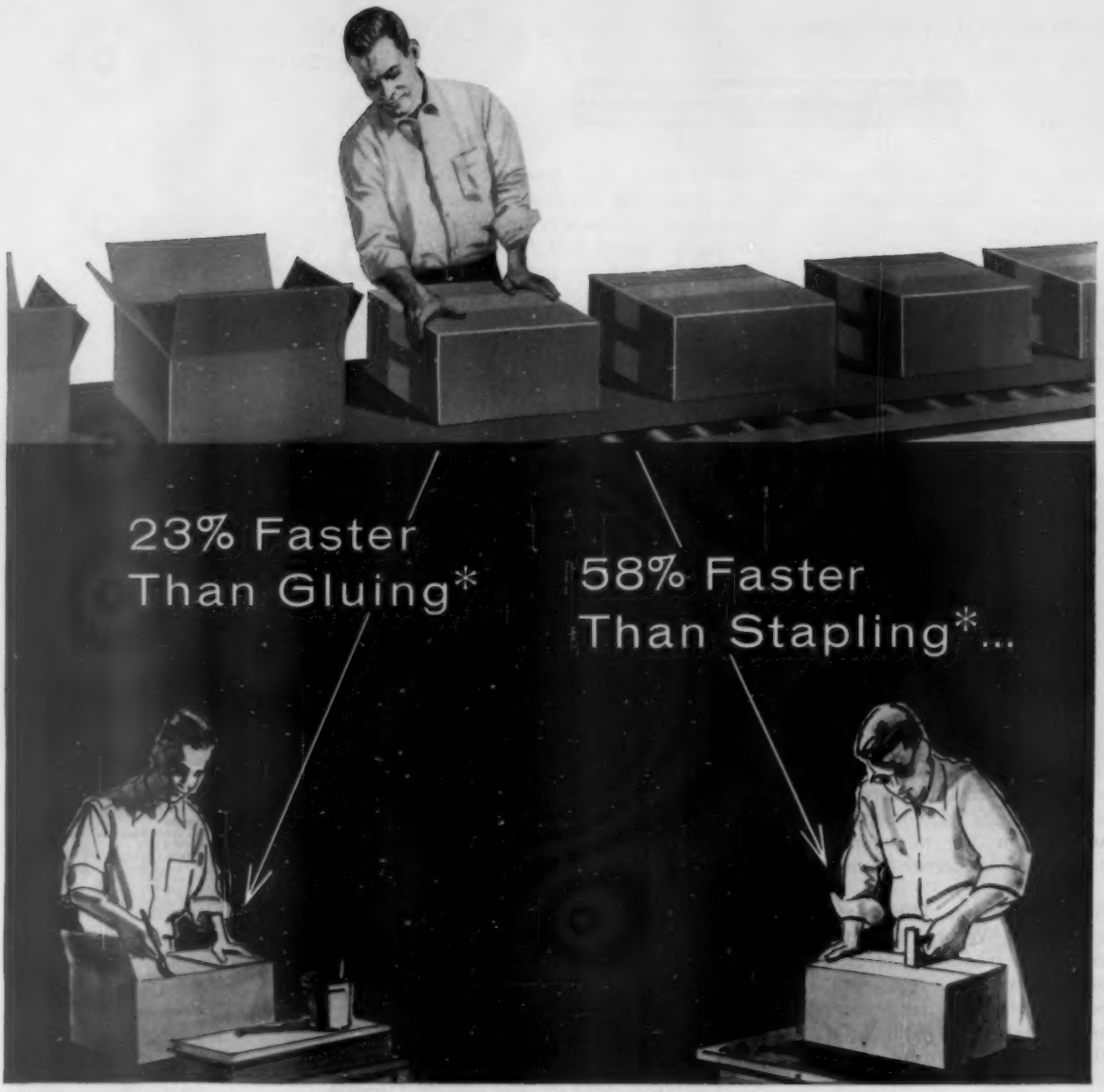
Invincibles handle almost any material—liquid or granular—that will pass through a vacuum hose. They cost little, last for years. In 22 models from ½ to 7½ H.P.—the most complete line of heavy-duty industrial vacuum equipment. Resident engineers in all principal cities.

WRITE FOR BOOKLET . . . It tells about the many materials Invincibles reclaim or remove.

INVINCIBLE

VACUUM CLEANER MFG. CO.
DOVER, OHIO

OVER 50 YEARS THE LEADER IN INDUSTRIAL VACUUM EQUIPMENT



That's Why Shipping Rooms Are Switching to 2-Strip Sealing and Cutting Costs

*Tests by an independent laboratory show that 2-strip sealing with reinforced tape permitted 55 more box closures per hour than gluing and 134 more closures per hour than stapling. As compared with older methods of tape sealing containers, 2-strip sealing requires only one-third the time. These appreciable advantages in time and labor savings are combined with security of closure — all carriers have approved the 2-strip sealing method using reinforced tape.

Both arithmetic and logic suggest that you join the switch to 2-strip sealing if you haven't already done so. Write for further information to our home office in Attleboro, Massachusetts.

SISALKRAFT

AMERICAN SISALKRAFT CORPORATION
Chicago 6 • New York 17 • San Francisco 5

reinforced paper, foil and plastics for construction, industrial packaging and agriculture

For more about these items, circle numbers on Reader Service Card next to back cover.

voltage regulators. Suggests applications. Covers d-c power supplies and frequency changers. Photos. *Sorensen & Co., Inc.*

262—Lamp Ballasts. This 4-pager (TES) describes service-guaranteed fluorescent lamp ballasts. Maker offers free replacement of inoperative ballasts for any type of fluorescent fixture within two-year period. *Universal Mfg. Corp.*

263—Diffusion Furnaces. Gaseous and solid diffusion furnaces are discussed in Bulletin No. 1081 (4 pages). Designed for manufacture of transistors and semiconductors, units are rated 6 to 20 kw. in either reactor or on-off control types. *Lindberg Engineering Co.*

264—Gear Motors. Bulletin No. 198 (8 pages) describes and illustrates features of geared speed reducers for all speeds, mounting methods, or environments. Points out advantages of compact offset shaft design for minimum floor space. *Sterling Electric Motors, Inc.*

265—Transistors. This brief four-page listing covers 412 different germanium transistors of all types currently available. All meet E.I.A. specifications. Power, switching, general-purpose, oscillator, and other designs are available. *Electronic Transistors Corp.*

266—Motors. Integral horsepower squirrel-cage motors (7½ to 125 hp.) are the subject of this 4-color illustrated bulletin (GEA-6602). Shows manufacturing methods, mechanical and electrical features, installation and maintenance advantages. *General Electric Co.*

267—Motors, Drive, Insulation. Three specification sheets: No. 252 has information on heavy-duty synchronous motors. No. 260 tells about super-sealed silicone insulation. No. 263 shows vertical magnetic drive for efficient, economic sewage/water pumping. *Electric Machinery Mfg. Co.*

268—Lamps. This 8-page bulletin (No. 89) gives candlepower curves and basic information on mercury vapor, infra-red, and incandescent lamps. Shows many special-purpose types like mercury spot, spatterproof welding, and long neck reflector lamps. *Radiant Lamp Corp.*

269—Variable Speed Drives. Application photos and schematic drawings are featured in this attractive 8-page brochure (F1963). Describes non-electronic adjustable speed system using standard induction motors, and various other types. *U.S. Electrical Motors Inc.*

270 — Thermocouple Connectors. New Quik-Konnect plugs and jacks for connecting and disconnecting remote thermocouple lines are detailed in this 4-page catalog (FS005-3). Connectors are polarized, match thermocouple alloys. *Minneapolis-Honeywell Regulator Co.*

271—Electrical Panel Boards. Two asbestos-cement materials for use in switchboards, bus-bar supports, relay panels for low-voltage applications are described in Bulletin IN-229A (4 pages). Materials offer good electrical and mechanical properties. *Johns-Manville Corp.*

272—Protective Equipment. Electricians' rubber gloves, sleeves, protectors, inner liners, and warning flags are illustrated in this 32-page catalog. Includes instructions for proper care of high-voltage rubber protective equipment. *Charleston Rubber Co.*

273—Metallic Rectifiers. Bulletin ER-300 (8 pages) describes germanium, silicon, and selenium rectifiers for general power applications—motor control, shop power, metal finishing, utility conversion. Lists protective systems offered. *Hanson-Van Winkle-Munning Co.*

274—Lighting Fixtures. Condensed Guide (V602, 8 pages) has photos and data on lighting fixtures and systems. Describes modular, louv-

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ASARCO

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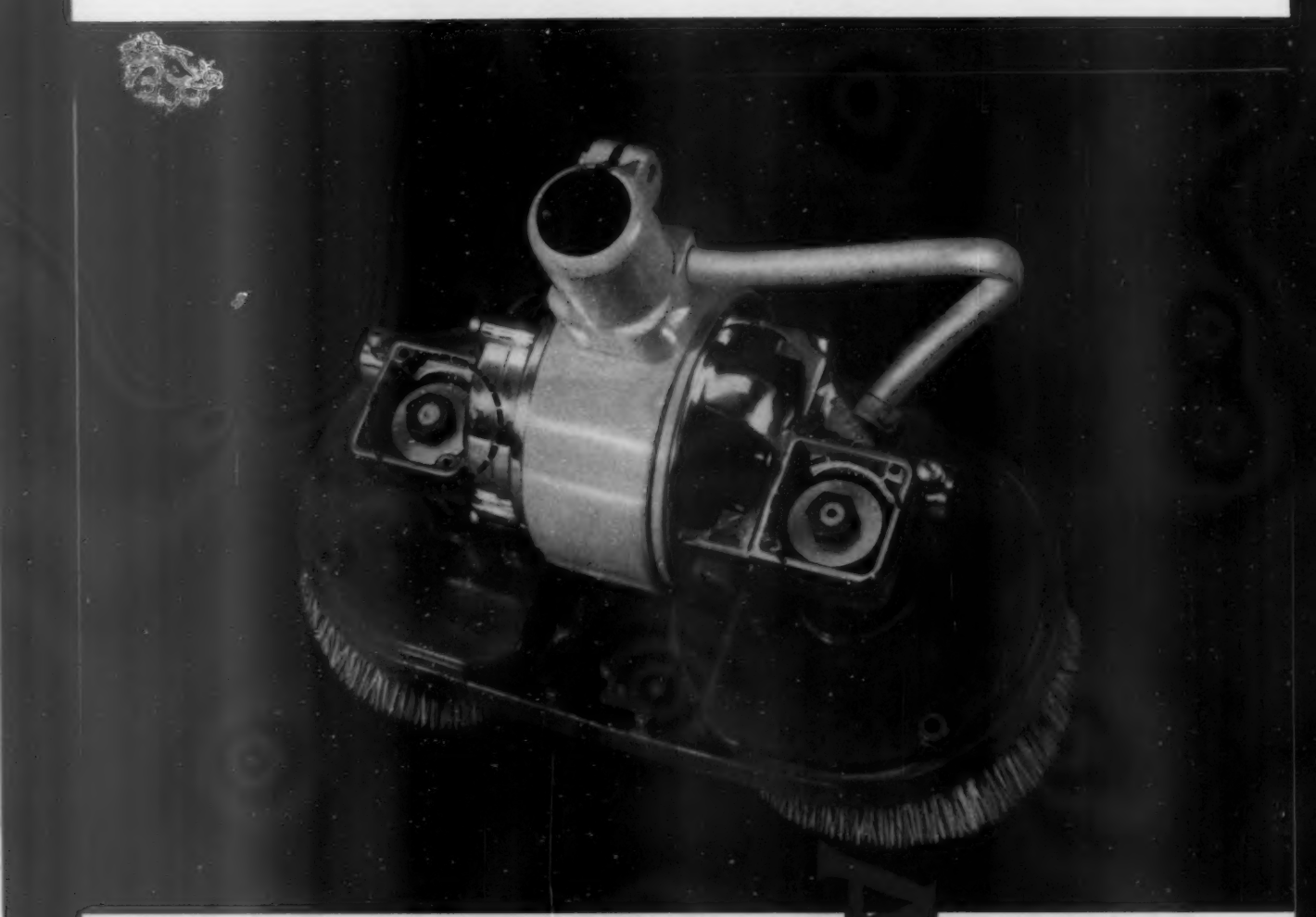


Worm gears for Regina Corp. floor polisher, are cast of Asarcon 1010B.

New free-machining phosphor bronze for longer wearing gears and bearings

ASARCON® 1010B

Continuous cast Asarcon 1010B has unique wearability under tough conditions, outlasting conventional gear bronze in performance by as much as 35%! It is an easy machining alloy, allowing higher speeds and feeds, fewer machining and finishing operations, reduced tool wear, and greater production per tool change.

Asarcon 1010B is one of many bronze alloys available in rods, tubes and special shapes, in continuous lengths up to 16 feet, diameters up to 9", within 1/32" of finished part, and the castings are guaranteed free of sand, porosity, blow-holes and other common casting defects. Write for complete information to Continuous Cast Department, American Smelting and Refining Company, Barber, New Jersey and Whiting, Indiana.

ASARCO

AMERICAN SMELTING AND REFINING COMPANY

CONTINUOUS CAST DEPARTMENT

West Coast Distributor: Kingwell Bros., Ltd., 457 Minna Street, San Francisco, Calif. In Canada: Federated Metals Canada, Ltd., Toronto and Montreal. Distributors in many principal cities.

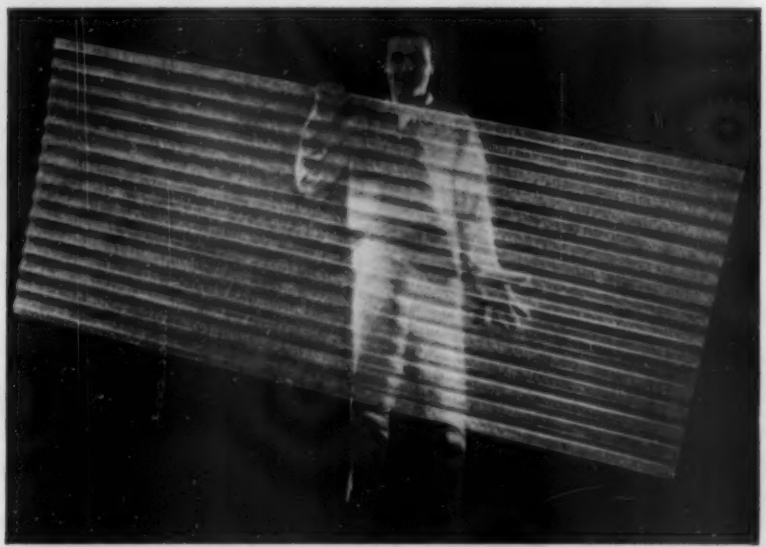
Free kilowatts from the sun . . . with

J-M CORRULUX SAVES ON LIGHTING COSTS. Why spend more than you have to for lighting your plant – when you can get plenty of free daylighting with translucent panels of Johns-Manville Corrulux? Shatter-proof Corrulux panels admit over 80% of the light (depending on color) – provide soft, diffused illumination that eliminates spotlighting and glare.

non-glare Johns-Manville CORRULUX

OOPS! BUT DON'T WORRY! Corrulux panels are immune to damage—accidental or deliberate—because these high-strength panes and sheets are impact-resistant. Corrulux is reinforced with fiber glass for extra strength . . . and protection against vibration. violence and most other in-plant dangers.

EASY TO WORK. Corrulux cuts with a handsaw, hand power saw, or hacksaw and fastens with the use of standard tools.



EASY TO INSTALL. Corrulux is light in weight, goes up quickly. It comes in large, easy-to-handle panels. No special framing needed. No installation tricks to learn. Ideal for new construction or remodelling. Comes in standard pane sizes and flat panels for reglazing, too.

WHERE TO GET CORRULUX. For full details, look in the Yellow Pages under *Plastics*, or write Johns-Manville, Box 158, Dept. FA (Key), New York 16. In Canada, Plastics and Allied Building Materials, Ltd., Dundas, Ontario.

JOHNS-MANVILLE

CORRULUX is a registered trademark of the Johns-Manville Corporation

JOHNS-MANVILLE JM PRODUCTS

They're made of National Vulcanized Fibre, a cellulosic plastic. Come in a "jillion" styles and sizes for any materials handling need.

Get the full, cost-cutting Kennett story now. Write for Bulletin O-5 today.

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WILMINGTON 99, DELAWARE

FACTORY / CATALOG NEWS

Begins on page 308

For more about these items, circle item numbers on Reader Service Card next to back cover.

ered, and linear systems for ceilings; also incandescent, mercury vapor, fluorescent types. *Sylvania Electric Products, Inc.*

275—Controls. This 56-page catalog (No. 860) illustrates and gives application information on pressure, temperature, liquid level, flame, controls, and auxiliaries—many for problem environments. Dimension diagrams for controls. Handy product index. *Mercoid Corp.*

276—Portable Test Sets. Brochure SB-OCR-1 (8 pages) has specifications, other data for high current output test devices for maintenance testing of relay settings, current transformers, recloser time lags. *Multi-Amp Electronic Corp.*

277—Fuse Products. Here's an 8-page brochure (No. 48) that describes renewal, one-time, plug, and Fustat types of fuses. Shows internal construction of ferrule and knife-blade types; midget renewables; single unit link and clip clamps. *Monarch Electric Corp.*

278—Cable Fittings. Many types of fittings for connecting, terminating, and grounding flexible armored cable are illustrated in this 28-page bulletin (1A2). Exploded views of connectors and accessories, materials, dimensions, etc. *Thomas and Betts Co., Inc.*

279—Circuit Breakers. Two bulletins: No. 4261-2B (8 pages) describes low voltage a-c breakers—up to 150,000 amp. interrupting capacity. No. 4601-1A (4 pages) covers d-c units–1200 to 12,000 amp., 1000 volts, 1 and 2 pole. *I-T-E Circuit Breaker Co.*

280—Switches. Bulletin 53-B1 (8 pages) describes line of a-c or d-c master switches for pilot control of hoists, cranes, etc. Bulletin 69-B1 has 12 pages of photos and application data on medium-duty pressure switches for pumps, compressors. *Furnas Electric Co.*

Turn the page

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offers 10 Dry Chemical Extinguishers for complete Class B and C fire protection

Your local Pyrene-C-O-Two distributor now offers 10 dry chemical extinguisher models, 2½ to 150 lbs., to give your plant complete protection against all flammable liquid, gas and electrical fires. Every dry chemical unit is charged with patented "Formula H," an exclusive, moisture-repellent, heat-resistant, non-caking powder that flows freely under all conditions. Every model is approved by Underwriters' Laboratories and Factory Mutual.

If you prefer stored pressure types, you can select from 2½, 5, 10, 20 and 30 lb. models. These units expel powder in a thick, blanket-like stream when the lever of the squeeze-grip nozzle is pressed . . . visual gauge shows operating condition. Or you can choose from 4, 20 and 30 lb. cartridge-operated models. After these extinguishers are inverted and the cartridge-piercing mechanism bumped, the dry chemical stream can be controlled by the squeeze-type discharge nozzle. Completing the line are 75 and 150 lb. wheeled portables which can easily be maneuvered indoors or out.

Your Pyrene-C-O-Two distributor will help you make your dry chemical extinguisher selections . . . or he can also show you a complete line of liquid agent or carbon dioxide extinguishers. Look for his local listing in your Yellow Pages under "Fire Protection Equipment."

Pyrene C-O-TWO

products of THE FYR-FYTER COMPANY, Dayton 1, Ohio

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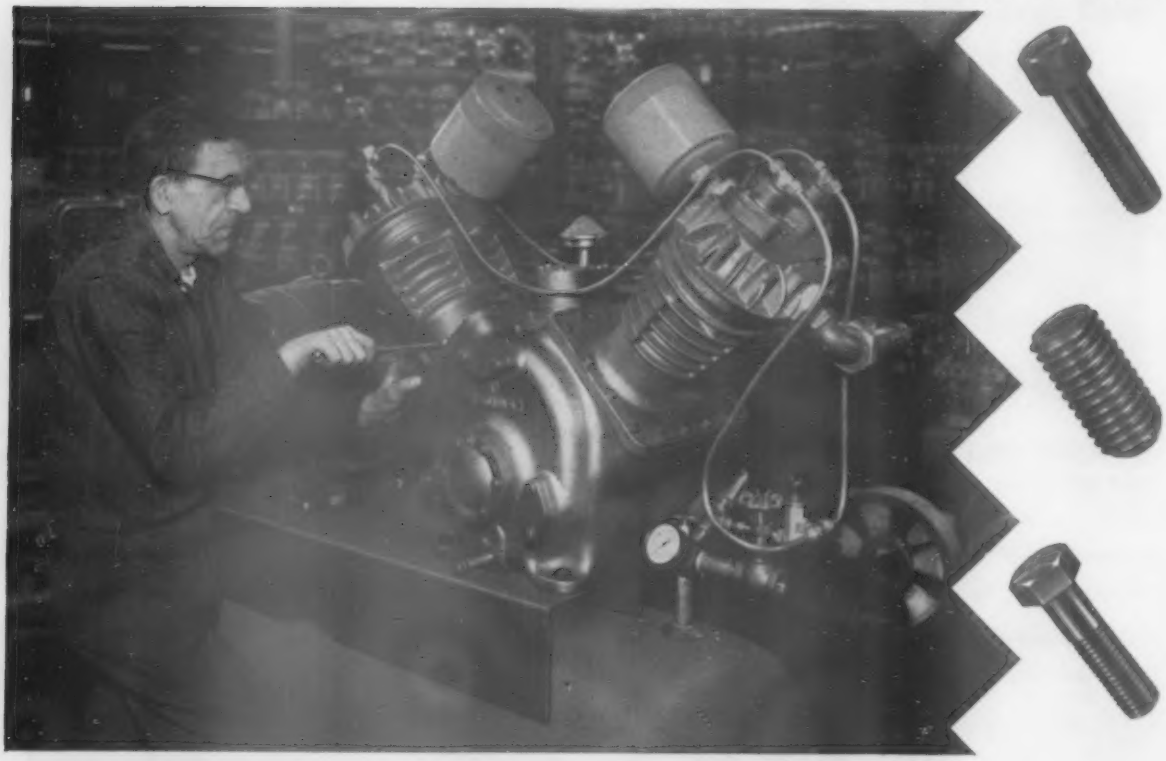
IT PAYS TO STANDARDIZE ON STANSCREW



Stanscrew provides faster service, adds safety for BRUNNER compressors

The fasteners this man is tightening must be really dependable. Dunham-Bush, therefore, maximizes the safety margin for its Brunner line by standardizing on Stanscrew heat-treated cap screws for all critical applications.

With tremendous production demands on its Hartford plant due to industry's preference for Brunner compressors, Dunham-Bush also demands a supplier who provides quick assistance on all occasions, and moves especially fast in emergencies. Stanscrew meets these requirements because complete stocks are maintained at three conveniently located plants . . . plus a management philosophy which looks on shipments within 24 hours as normal procedure, subject to drastic improvement in emergencies.

Fast delivery and reliable products are but two of many reasons more and more industrial leaders are switching to Stanscrew. A complete selection of over 5,000 different standard fasteners . . . experienced fastener specialists to provide qualified technical assistance . . . these and many other factors underline the advantages of specifying Stanscrew for your fastener requirements.

Why not call your Stanscrew distributor today. He will gladly arrange a prompt visit from the Stanscrew specialist who can often save you money . . . for example, by substituting a standard fastener for a costly special.

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STANDARD SCREW COMPANY 2701 Washington Boulevard, Bellwood, Illinois

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FACTORY / CATALOG NEWS

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For more about these items, circle item numbers on Reader Service Card next to back cover.

281—Fluorescent Lamps. This 20-page practical guide (No. A4759, revised) has useful details on fluorescent lamps, ballasts, starters, and lampholders. Gives operating characteristics, including effects of d-c operation, vibration, etc. *Westinghouse Electric Corp.*

282—Infra-Red Lamps. Here's a 4-pager (No. 1-970) that presents tubular quartz infra-red lamps, 375 to 3800 watts, and advantages of their use for drying, preheating, baking, soldering jobs. Dimensions, wave-length chart. Photos. *Sylvania Electric Products Inc.*

MATERIAL HANDLING

283—Work Positioners. Six-page folder illustrates portable Lowerator self-leveling work positioners. Includes drawings, dimensions, and capacities of closed, open side, cantilever models. Calibrated spring mechanism controls units. *American Machine & Foundry Co.*

284—Fibre Containers. Baskets, cans, box trucks, and mill boxes are described in this 6-pager. There are photographs, specifications, construction features, as well as the sizes, shapes, and colors available. All are vulcanized fibre material. *Federal Fibre Corp.*

285—Wirebound Boxes. Booklet (8 pages) points out advantages of wirebounds, lists a number of possible uses. Bulletin IP-58 (4 pages) covers reusable pallet boxes, has step-by-step assembly and disassembly photos. Lists dimensions, weights, capacities. *General Box Co.*

286—Bulk Material Bins. A whole system of bulk material handling based on standarized bins is described in Catalog No. 7, a 20-pager. Includes photographs of several systems in operation, detailed drawings, and an exploded view that shows important construction details. *Tote System, Inc.*

Turn the page

You never forget weekly, semi-monthly or monthly lubrication and inspection when Acme Visible is on guard. Maintenance, repair and parts records for each machine are a unit. Therefore all pertinent facts are together. And each unit carries colored signals that flag your eye when it's time to act. Result, far less down time. More production. Send for facts.

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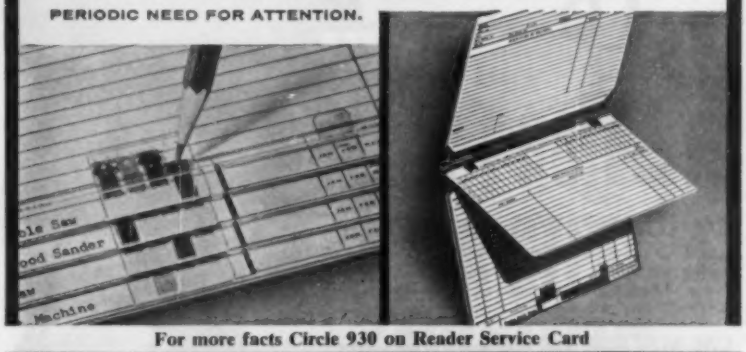

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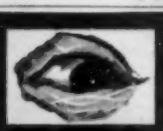

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CM HOISTS

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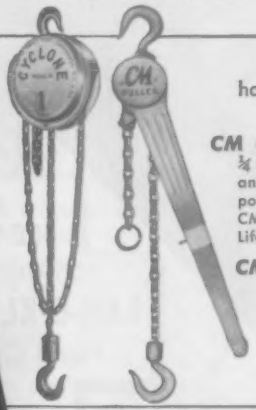
⅛ to 2 ton capacities—First truly heavy duty version of small electric hoist. ⅛ ton model weighs only 51 lbs. Heavy duty self-adjusting brake. Upper-lower safety limit switches. CM-Alloy load chain.

CM METEOR ELECTRIC WIRE ROPE HOIST
½ to 5 ton capacities—Compact, enclosed design. Low headroom. Continuous duty motor with thermal overload protection for heavy duty service. Precision bearings and helical gears for long life. Only 110 volts at push button control.

Good Suggestion for the Maintenance Man!



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CM CYCLONE HAND HOIST
¼ to 10 ton capacities—Easy to carry and lift. One ton model weighs only 36 pounds. Made of tough aluminum alloy. CM-Alloy load chain. High efficiency. Lifetime lubrication.

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For more about these items, circle item numbers on Reader Service Card next to back cover.

287—Lightweight Vehicles. Full color literature (6 pages) shows models of the Truckster in both electric and gasoline versions. Gives performance figures, available body accessories for a variety of jobs, mechanical specifications, capacities. *Cushman Motors.*

288—M-H Tools. Clamps, drum lifters, hand grips, slings, fork-lift attachments, and other handling tools are described in Catalog C-2 (20 pages). Drawings, specifications, safety limits. Photos illustrate many of the tools in use in the plant. *Merrill Brothers.*

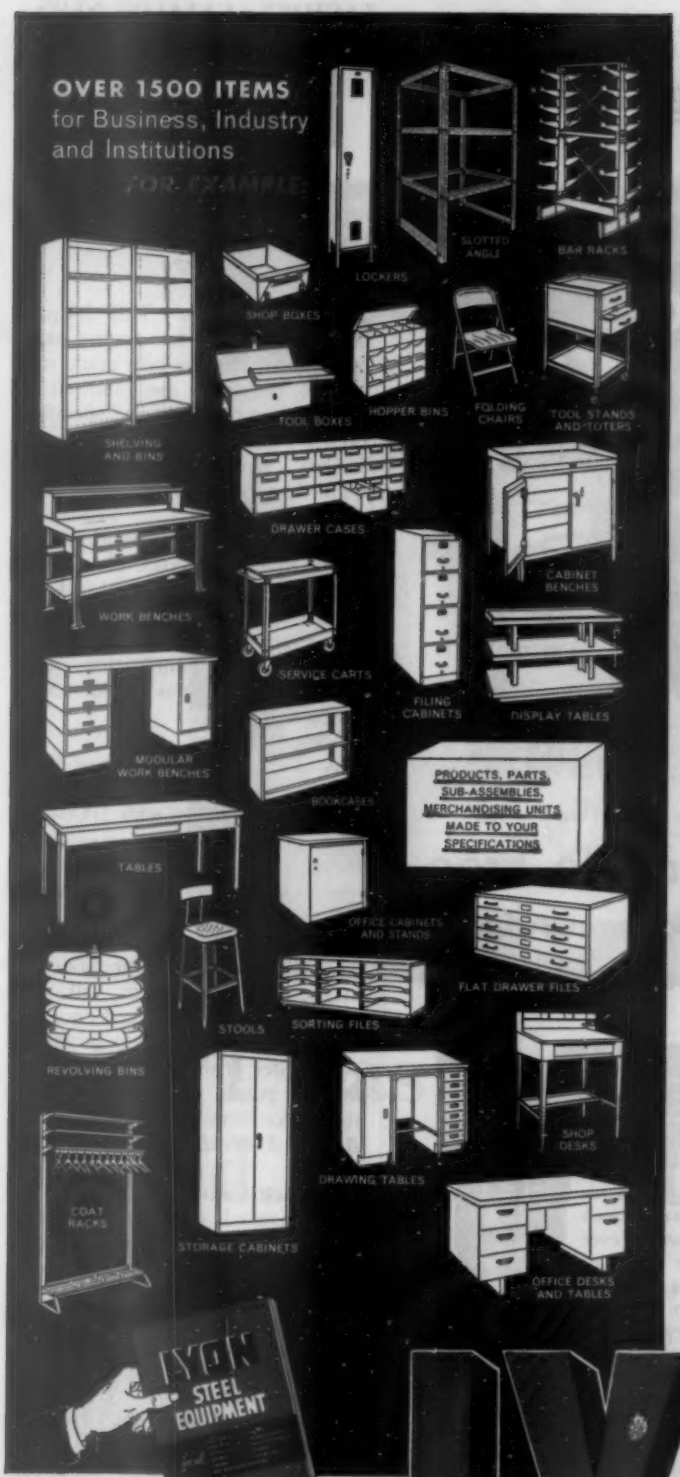
289—Glass Fiber Containers. Twelve-page booklet covers pans, trays, carts, trucks, Stack-n-Nest containers. Describes features, standard sizes, test results, accessories. Pages of photographs show uses, may point out an application for your operation. *G. B. Lewis Co.*

290—Special-Duty Trucks. Catalog Brief 160 (28 pages) illustrates company's full line of heavy-duty, special-purpose trucks. Also shows dozens of truck bed containers for scrap, bulk materials, trash, liquids, gases. The trucks are self-loading. *Dempster Brothers.*

291—Loading Ramp. A pair of 4-pagers tell about the Dockbridge, an automatically bridging ramp that equips docks to receive high or low bed trucks without loss of dock area. Step-by-step cutaway drawings show how it works, how to install. *American Dockbridge, Inc.*

292—Fork Trucks. Several models of fork-lift trucks are shown in this 16-page booklet. Includes electric, propane, diesel, gasoline, and diesel-electric models. Booklet has complete performance and specification tables for each one. *OM Lift Co. of America, Inc.*

293—Steel Drums and Pails. Catalog (46 pages) lists hundreds of steel containers. Here you'll find light shipping drums, ICC returnable



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Are you really operating your compressed air equipment with clean, dry air . . . or with air laden with oil and water and other trouble causing impurities? Tool malfunction, production down time, off grade work almost always can be traced to dirty, contaminated air. Compressors are designed only to bring ambient air to operating pressure. This air is saturated with moisture and oil vapor which must be removed to guarantee maximum production efficiency.

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FACTORY / CATALOG NEWS

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drums (for shipping regulatory products), special purpose and shipping pails. Specifications. *Jones & Laughlin Steel Corp.*

294—Crane Rails. This 24-page booklet (No. 464) has several pages of photos that show how crane rails are made. These are followed by pages of rail drawings and specifications. Also illustrates clips and holders, gives steel specifications. *Bethlehem Steel Co.*

295—Wire Rope. Hundreds of slings, thimbles, hooks, clips, links, and shackles are described in Catalog 3026 (60 pages). Extensive tables give specifications for slings alone or in combination, used straight or at angles. *Broderick & Bascom Rope Co.*

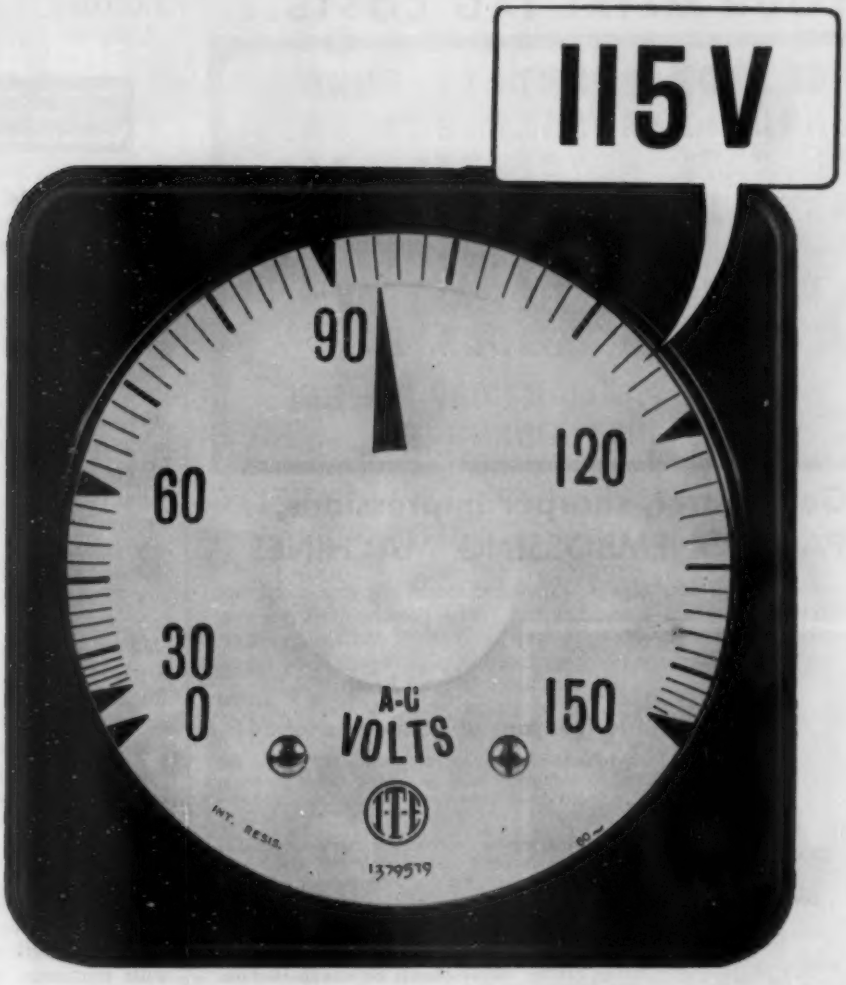
296—Fork Trucks. Bulletins 599-1 and 598-1, 6-pagers, tell about two new fork-lift trucks with 2000- and 4000-lb. lift capacities, respectively. Detailed descriptions, photos, and performance data for both. *Barrett-Cravens Co.*

297—Dockboards. Four models of magnesium dockboards, all with one-piece curb and forged ends, are illustrated and described in this 4-page folder. It shows the dockboards in use, points out design features that make them safe and easy to use. *Brooks & Perkins Inc.*

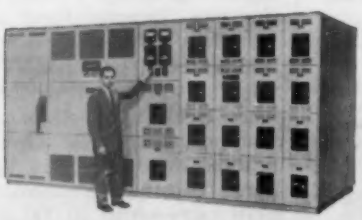
298—Belt Conveyors. Catalog 909 (120 pages) is filled with so much technical data that it might be considered a conveyor users' handbook. Company's complete line of conveyor equipment is covered and there are pages of engineering information. *Jeffrey Mfg. Co.*

299—Power Conveyors. Here's a 64-pager showing a number of continuous power conveyors for a wide variety of industrial applications. Includes suggested layouts, engineering service centers, lubrication recommendations, numerous accessories. *Richards-Wilcox Mfg. Co.*

Turn the page



"But I was positive we didn't need another substation!"



MORAL: For good voltage regulation and better operating efficiency, put a secondary unit substation in each load area. And for complete information on today's most value-packed line of substations, write for Bulletin 3104-1A, I-T-E Circuit Breaker Company, Dept. SW, 1900 Hamilton Street, Philadelphia 30, Pa.

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SINGLE OR QUANTITY RUNS
CLEARLY EMBOSSED .008 GA.
DUPLICATE METAL TAGS ARE
EASY. FAST. ECONOMICAL
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SIMPLIFIED METHOD OF
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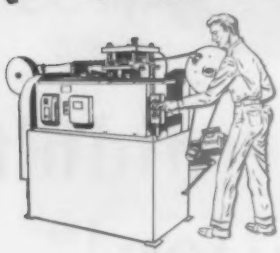
. . . Get clearer, sharper impressions, with PANNIER EMBOSSING MACHINES

Whether you use embossed metal tags in large, production quantities — or just a few, occasional tags — Pannier simplified embossing equipment is engineered to provide your metal tags at the lowest possible cost, greatest safety and easiest readability. Inexperienced help can operate any of the machines, large or small.

One to four tags at a time (model 344)

Model 344 Pannier Embossing Machine has two uses. It can emboss up to 4 duplicate tags, like that pictured above, in sizes up to 3" x 5½" or longer, at one operation (one letter at a time).

This same machine provides the low cost, matched male and female embossing matrices (shown at left) for use with Model 207. Paired, these two machines provide complete equipment for volume tag production.



Volume Tag Production (No. 207)

The Pannier Master Marker Embossing Machine, Model No. 207-H-6 automatically produces up to 60 duplicate tags per minute, employing coils of Pannier Safety Tag stock. These tags, in strip form, are nicked and notched for easy detachment from the coiled strip. Embossing impression is made by inexpensive male and female metal matrices—that cost only a fraction of type-and-matrix methods. The machine operates by start-stop pushbutton control. Fingers never approach the embossing area.

For single, occasional tags

Pannier engineering provides a wide range of Master Marker Embossing Machines to suit any quantity requirement. This small hand-held Embosser makes individual tags on half-inch strip metals or vinyl plastic.

Pannier Embossed Tags

You can order all your tag requirements from Pannier. They're embossed for you on these same machines. Tags are low cost and delivery service is fast. They can be made to your specifications, or write for standards and price list.

Write for literature or Pannier engineering service, specifying style and quantity of tags you require.

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300—Vibrating Feeders. Book 2869 (12 pages) describes and illustrates more than 60 sizes of vibrating conveyors. Trough lengths run from 4 to 14 ft., widths 1 to 6 ft., and capacities from 5 to 1700 tons per hour. Illustrates possible applications. *Link-Belt Co.*

301—Casters and Wheels. A full line is described in this 40-page booklet (Form DP-104) which covers all types of industrial casters with hard or soft treads, pneumatic or semi-pneumatic tires, several options in design features. *The Rapids-Standard Co., Inc.*

302—Imprinting Machinery. This 8-pager provides data on equipment for automatic high-speed imprinting on cartons, multi-wall bags, cardboard containers. And there's an attachment for printing foil, polyethylene, etc. *Industrial Marketing Equipment Co. Inc.*

303—Containers. Paperboard containers described in this 4-pager have special metal-reinforced corners for strength and crush resistance with minimum weight. Lists tote trays, dustproof boxes, nesting hoppers, coin boxes, and parcel post mailers. *Metal Edge Industries.*

304—Motor Pumps. This 8-pager (Form 70021) covers representative models of the company's line of motor pumps for handling gasoline or fuel oil. Units for fully flooded suction or suction subject to vortexing or vaporizing. Photos, cutaway drawings. *Ingersoll-Rand.*

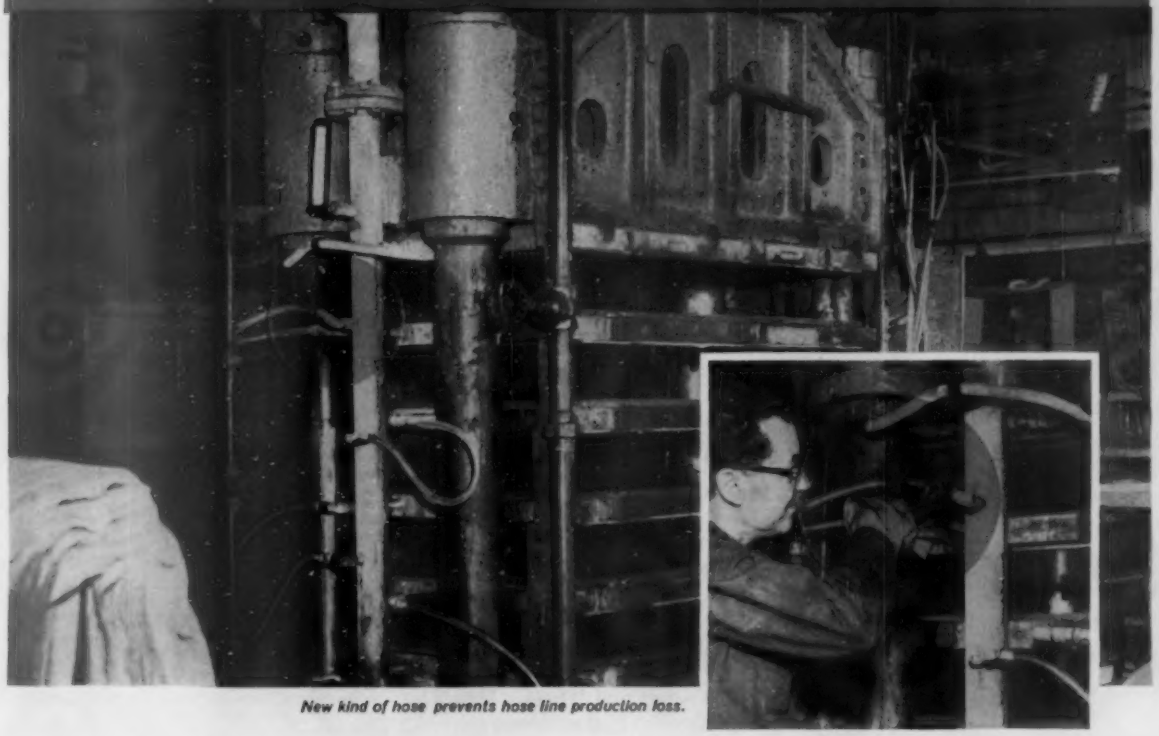
305—Trucks. Catalog 357 (12 pages) lists several models of 4-wheel trucks with both hard rubber and pneumatic tires. Gives specifications, load capacities, accessory parts, construction details. Some units carry up to 40,000 lbs. *The Ohio Galvanizing & Mfg. Co.*

306—Conveyors. Both portable and permanently installed conveyors are illustrated in this 8-pager. They move materials in trucks, barrels,

A hot steam tip from Goodyear... *long life*

on curing presses results in standardizing on Aeroquip Hose of Teflon *and "super gem" Reusable Fittings**

...from Job Report, Goodyear Tire and Rubber, Inc., Windsor, Vermont



New kind of hose prevents hose line production loss.

Costs were cut, of course, but, more important, effective production was increased when Goodyear got rid of curing press steam hose failure caused by heat. Only change was replacing with Aeroquip Hose of Teflon and ***"super gem"*** Reusable Fittings. Result: lower maintenance costs, improved production. Now all lines on presses are being changed to Aeroquip as rapidly as possible.

Similar reports from enthusiastic users show you're in good hands when you consult with Aeroquip. Full information on better performing Aeroquip Hose of Teflon is given in Bulletin IEB-50. Your Aeroquip distributor, a fluid line specialist, will give you a copy. He'll discuss, without obligation, various applications that might be helpful to you. His number is in the "Yellow Pages"— under "Hose".

*"*super gem"* Fittings are covered by U.S. Patents Nos. 2,731,279 and 2,833,567, and corresponding foreign patents and patent applications. *"*super gem"* is an Aeroquip Trademark.

Teflon is DuPont's trade name for its tetrafluoroethylene resin.

Aeroquip is so easy to use—inventory's just a few feet of hose and a handful of fittings.

STANDARDIZE ON Aeroquip

REG. TRADEMARK

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Mechanical Models attach to machine.

Electrical Models may be placed in plant office.

Write for folder.

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boxes, bales, or on pallets. Catalog includes attachments, optional features, installation photos. *Wehle Conveyor Co.*

307—Conveyors. Catalogs C-60 and P-60 (4-pagers) show uses of pneumatic conveyors for ash removal in steam plants, reclamation of chips and borings, handling dry granular materials, small parts handling, reclamation of cutting oils. *National Conveyors Co., Inc.*

308—Power Trucks. Equipment Selector Catalog 80-204 (16 pages) offers specifications and illustrations of rider fork-lift trucks, rider tractors, narrow aisle electrics, electric "walkies," and manual equipment. Selector chart for quick reference. *Lewis-Shepard.*

309—Stock Racks. A pair of 4-pagers describes portable bar racks and Mini-Module prefabricated stock storage racks. Drawings give dimensions, photos show how to use to get maximum storage area. Specifications. *Jarke Mfg. Co.*

310—Casters and Wheels. Here's a 12-pager (C-57) that covers casters in many sizes and models. Lists nylon-reinforced all-plastic wheels, solid rubber wheels, pneumatic rubber-tired, and semi-steel models. Color-coded tables give specifications. *The Fairbanks Co.*

311—Pneumatic Conveyors. Principles of pneumatic conveying are explained in this 4-pager, Bulletin 143-B. Includes diagrams of typical stationary and portable systems, with tables of capacities, photos of equipment and installations. *The Spencer Turbine Co.*

312—Cranes. Bulletin 900-2 (20 pages) covers double girder overhead cranes, single girder overhead and underhung models in hand-geared and motor-driven designs. No. 920 (12 pages) lists hoists, hooks, motor brakes, cable drums, trolleys, motors. *Robbins and Myers.*

Turn to page 413

MANAGING BY COMMUNICATION

Shows how—by communicating effectively—you can gain greater cooperation of employees, and make your personal leadership more resultful. Explains how to use communication to improve employee, union, and community relations . . . describes proven techniques, principles, and media. Specific uses of communication such as getting employee action, and handling crises are also discussed. **By W. V. Merrihue, General Electric Co., 320 pp., illus., $7.00**

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Describes how to plan, install, and maintain a successful standard costs program. Covers every operational expense—from maintenance labor costs to fuel and power expenses. *Third Edition* brings you abreast of current labor rates and engineering aspects. Shows you how a program can help you forecast a budget, simplify cost-accounting procedures, and evaluate jobs and salaries. **By S. Henrici, Indus. Eng. 3rd Ed., 392 pp., $8.50**

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Presents statistical methods with emphasis on applications to managerial decision making. Vital principles and techniques are fully described, using simple mathematics. Among topics covered are multiple regression and correlation with workable computing schemes, the analysis of variance, and queuing and inventory problems. **By E. C. Bryant, University of Wyoming. 325 pp., $6.50**

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DOWNTIME

Costs start climbing the minute a fork truck goes out of service. The national average for truck downtime is conservatively estimated to be $16.48 per hour. An important reason why fast, qualified parts service is essential.

It's why Clark dealers offer you the largest inventory of parts in the industry. It's why Clark maintains a 16,000 mile private wire communication system. It's why Clark has built a multi-million dollar parts warehouse near Chicago's Midway Airport.

Everything in the Clark service system is geared to speed. Vital materials handling equipment must be back on the job *fast!* To assure you of fast service Clark provides you with over 117 service facilities throughout the nation . . . each carrying a complete parts inventory. To back this up, the Clark Central Parts Depot maintains an inventory of over 5 million parts . . . emergency parts that can be air-shipped to any part of the country in a matter of hours. *Only* Clark offers you this service.

Want to see how it's done? A colorful brochure and a film strip describing this service system are available through your local Clark dealer. You'll find him listed in the yellow pages under "Trucks, Industrial." Or, if you prefer, write direct to: Clark Parts Service, Clark Equipment Company, Battle Creek, Michigan.

CLARK® EQUIPMENT

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ROCKWELL EARNS 26% ANNUAL RETURN ON CARRIER AIR CONDITIONING INVESTMENT

Everyone knows that people in air conditioned buildings feel better and work better during hot weather. But do such benefits pay off in an industrial plant? Is it possible to figure how much air conditioning actually increases worker productivity?

The answer is an unqualified "yes," as many companies are learning from personal experience. One of them is Rockwell Manufacturing Company, leading producer of meters, valves and power tools.

When Rockwell installed Carrier air conditioning in six plants several years ago, its management was aware that a mere 1.5% increase in work productivity would cover the owning and operating costs. Actual results, however, exceeded the most optimistic hope. The increase in work output during summer months has boosted annual production 4.5%—or three times the increase required to make air conditioning pay off.

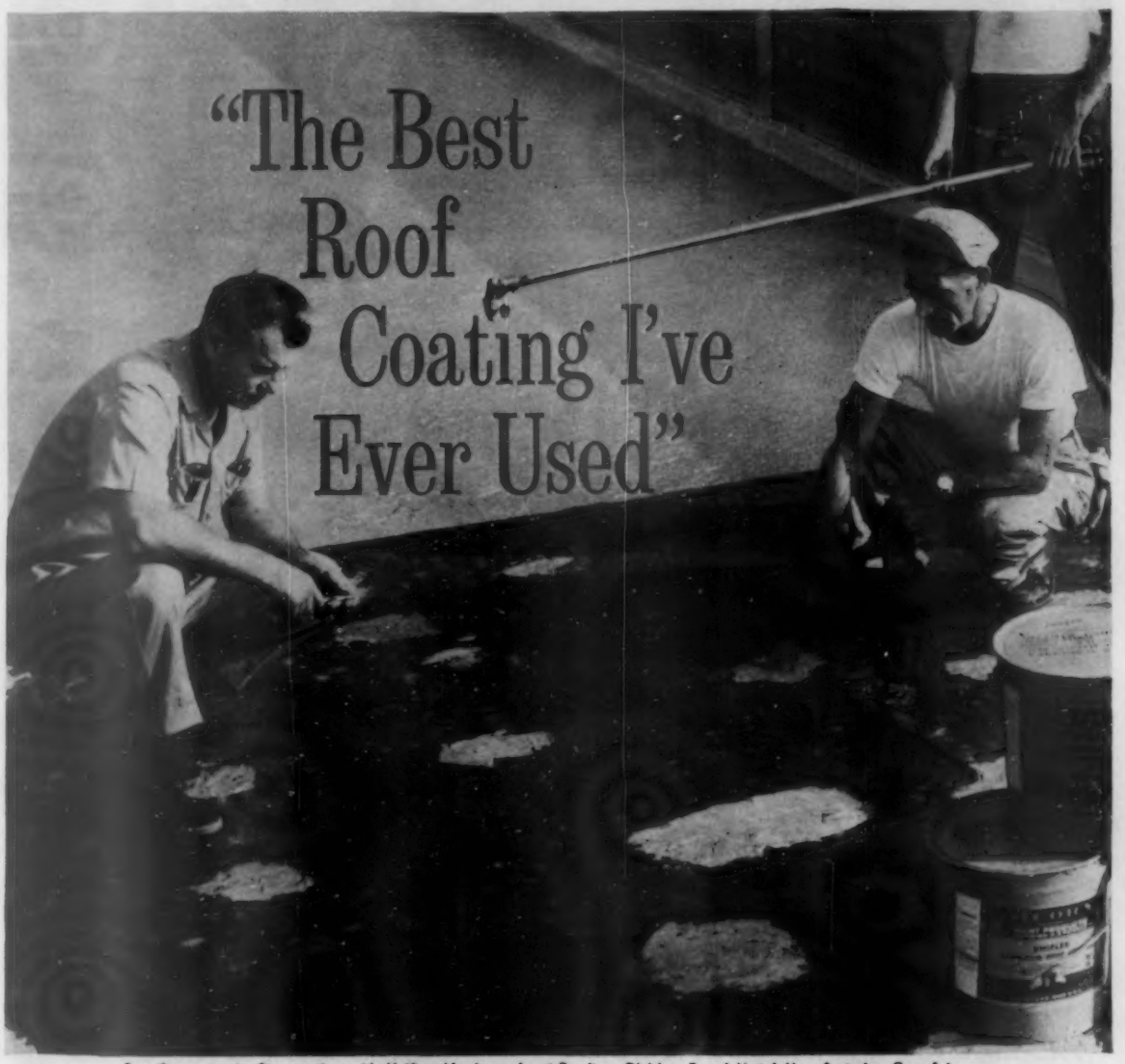
The profit return on their air conditioning investment has been even more spectacular. According to Rockwell records, air conditioning is earning a 26% annual dividend! And this does not take into account such difficult-to-measure but important benefits as improved morale, better workmanship, less turnover and absenteeism.

Significantly, these gains are not affected by geographical location or the nature of the products manufactured. Rockwell, for example, has Carrier air conditioned plants in Pennsylvania, Nebraska, Georgia, Kentucky, Mississippi and California which employ a wide variety of manufacturing techniques.

On the other hand, there is one important factor to consider in determining the profit potential of comfort air conditioning. This is the population density in a plant or plant area. Where the number of square feet per worker is low, the return on an air conditioning investment will be high.

There are other yardsticks, too—all of them described in the booklet, "Will factory air conditioning pay off for me?" which we will be glad to send to you without obligation. Write for it today so that you can make your own decision. Carrier Corporation, Syracuse, New York. In Canada: Carrier Engineering Ltd., Toronto.

Contractor reports on UNIFLEX ALUMINUM



See the contrast after coating with Uniflex Aluminum. Arnot Furniture Division, Royal Metal Manufacturing Co. of Jamestown, N.Y., is a famous manufacturer of office furniture. Uniflex is made by the Acorn Refining Co., Cleveland 2, Ohio.

Here's "before-and-after" on a furniture factory

This 10-year-old built-up roof of the Royal Metal Manufacturing Company plant, Jamestown, N.Y., was cracked, blistered and leaking when Contractor C. W. Noyd was called in. Mr. Noyd's immediate recommendation: Uniflex Aluminum Roof Coating, made with Alcoa® Pigments.

See the job in progress. Larger holes were patched, then Uniflex Aluminum Calking Compound sealed all windows and parapet walls—then a gleaming, over-all surface of reflective Uniflex Aluminum Coating. Result: waterproof protection and uniform, good appearance that will last for years. Mr. Noyd states, "Uniflex Aluminum is the best roof coating I've ever used."

Today, experienced roof men everywhere are recommending aluminum coatings like Uniflex. They've found that one coat seals any surface—metal, masonry, composition—with a moistureproof shield that won't sag in summer or crack in winter.

Reflective aluminum pigment turns back 70 per cent of the sun's heat, reduces inside temperatures. Applied with ordinary roofing brush or special spray equipment, these coatings come ready mixed . . . require no thinning or heating.

Alcoa does not make aluminum roof coatings, but we will be happy to refer you to reputable manufacturers who do. Send coupon today for our free booklets.

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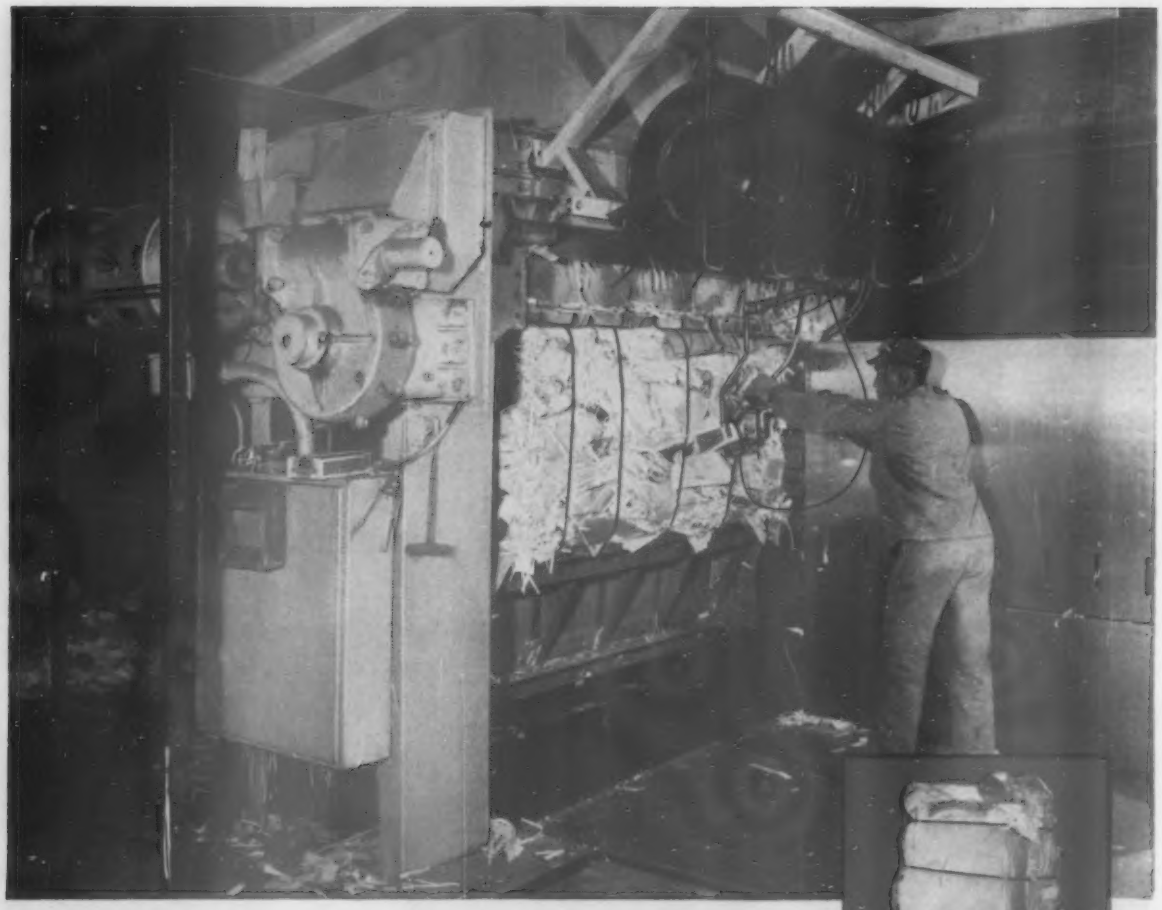

Bale Waste Paper?

Signode way is faster, easier, cheaper, safer
...uses your present baling press!

Faster and *easier* because fewer ties are needed per bale; the inexpensive Signode setup eliminates waste motions of reaching, twisting, splicing; strapping feeds handily from conveniently located overhead dispensers.

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Safer because flexible strap ends drop down, are easy to see; no sharp ends poke at man on receiving side; bales are squarer, firmer...safer and neater to handle, stack, load.

It's easy to change to this proved method. Signode fieldmen know how to adapt it to your present baling equipment...are ready to work with you now. If you bale waste paper or any other compressible material or product in any quantity, write for your free copy of "How to Save Money on Your Baling Operations."

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FACTORY

FACTORY / CATALOG NEWS

Begins on page 308

For more about these items, circle item numbers on Reader Service Card next to back cover.

313—Slotted Angles. These units look like erector sets in factory sizes, build everything from a single shelf to an entire room. Bulletin 180 lists uses, shows standard components available, tools for fabrication, and various other data. A 12-pager. *Lyon Metal Products, Inc.*

314—Slotted Angles. Catalog S-103 (8 pages) tells how company's line figured in the 1960 Olympics, describes four sizes of versatile building components. Includes specifications, describes tools and accessories (such as shelves, guidewheels). Illustrated. *Dexion Inc.*

315—Wire Rope Slings. Twelve-page booklet (A935) details dozens of cable-laid wire rope slings with hooks, sockets, shackles, thimbles, and loops. A 4-pager (A944) carries tables on slings with tapered sleeve splice. Dimensions, photos. *J. A. Roebling's Sons Corp.*

316—Conveyors. Complete conveyor systems, as well as a full line of accessories, are covered in this 52-pager. Lists trolleys, couplings, drives, cut-outs, speed reducers. Has tables and charts of engineering information, cutaway drawings. *Anchor Steel and Conveyor Co.*

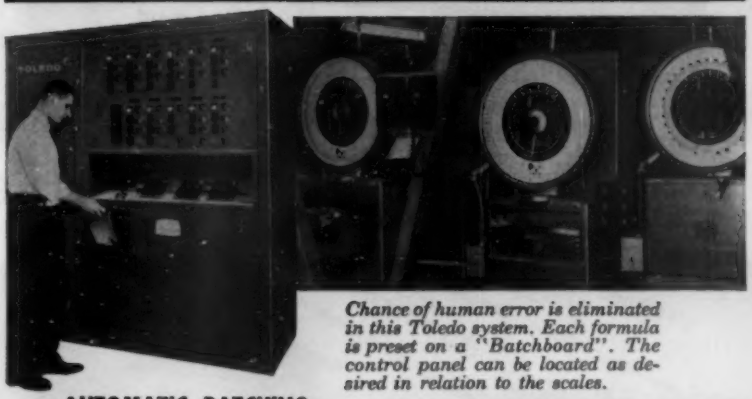
317—Roller Chains. Booklet of 52 pages (ARC-55B) offers complete specifications on roller chains and sprockets, carries several pages of engineering data. Listings include price, suitable operating environments, maintenance tips. *Atlas Chain & Mfg. Co.*

318—Corrugated Boxes. Telescoping boxes with high puncture resistance are described in this 4-page folder. Cross section of the "926" box shows construction, emphasizes stacking strength. Folder illustrates set-up and handling machinery. *Gaylord Container Corp.*

319—Strapping Tools. Three 4-pagers: SPD 216 covers air power tensioners and sealers; SPD 238, power combination strapping tools;

TOLEDO Reports on Automatic Weighing

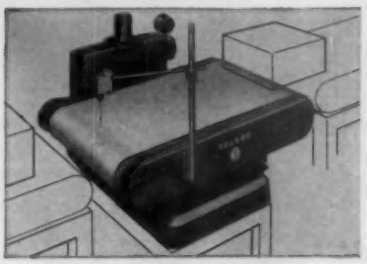
★ NEW IDEAS FOR COST-SAVING



Chance of human error is eliminated in this Toledo system. Each formula is preset on a "Batchboard". The control panel can be located as desired in relation to the scales.

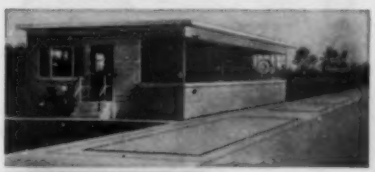
AUTOMATIC BATCHING

Operator at convenient remote location has full command of a multiple scale batching system with Toledo Remocon. As many formulas as required are pre-set on "Batchboards" and inserted into panel. This is one of several types of Toledo remote-control batching systems for today's needs, including punch card, "Formulaplug" and digital scanner. Ask for Bulletin 2964.



CHECKWEIGHS IN-MOTION

Many plants today are putting Toledo Automatic Checkweighers into their conveyor lines. Models to provide continuous, 100% in-line checkweighing of items from a few ounces to 200 pounds. Motorized belt. Handle sacks, cartons, packages, pieces, parts. Ask for Bulletin 2968.



LOAD CELL DIAL DOES TRIPLE DUTY

... ALSO PRINTWEIGH RECORDING

One remote dial serves *three* platforms in this Toledo Electronic Load Cell Scale for truck weighing at a large cement plant. With a truck on three platforms, scale reads individual axle loads or total weight. Equipped with Printweigh "400" to print full figure weight data. Brings new versatility to weighing. Request Bulletin 2970.

AUTOMATES DRUM-FILLING

In this oil industry plant, a Toledo sub-surface filler automatically eliminates foaming and controls drum filling. The scale is keyed into conveyorized system . . . provides faster, more accurate filling. Saves time, labor, avoids loss of material and customer goodwill. One of many operations where Toledo controls guard costs. Ask for Bulletin 9030.

●

WRITE TODAY for specialized help from our Custom Products Division, or contact the Toledo Office near you, to solve your problems in batching, checkweighing, drum-filling, load cell applications. TOLEDO SCALE, Division of Toledo Scale Corporation, Toledo 12, Ohio.

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battery powered boom lift, hydraulically actuated

welded construction, anti-friction bearings throughout

available hand pushed or self-propelled

also hand hydraulic operation for explosion hazard areas

small, compact, highly maneuverable

VANGUARD AERO-CRANE

the economy counterbalanced mobile floor crane

The Vanguard Aero-Crane gets to places not accessible to other equipment. It reaches out . . . up to 72-inches beyond the front wheels, then over and into machinery without straddling the load. Space above the load need not be clear to the ceiling. The load need not be set on a pallet before handling either. Aero-crane has a 9-foot high reach: picks the load way up, brings it down to just one-foot from the floor. Other quality features are listed above.

Visit the Vanguard Space at the Material Handling Institute's regional show, June 6-8, 1960, Booth 507-511, Boston Armory

Vanguard

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FACTORY / CATALOG NEWS

Begins on page 308

For more about these items, circle item numbers on Reader Service Card next to back cover.

SPD 251, manual combination strapping tools. All three catalogs show the equipment in use. *Signode Steel Strapping Co.*

320—Containers. This 18-page brochure details the construction and applications of Palletainers, welded wire folding containers with built-in fork lift holes. Lists light- and heavy-duty models available. *Union Steel Products Co.*

321—Cranes. Custom-engineered cranes built from standard components are described in this 12-pager, No. 5000-B. Includes information on overhead crane bridges, trolley hoists, component kits, specialty cranes. Photos of installations. *Conco Engineering Works.*

322—Hoists. Combined Catalog 1960 (92 pages) offers chain hoists, trolleys, electric hoists, and chain pullers as well as traveling, jib, and portable cranes. Photographs, drawings, and specifications for all overhead equipment. *Columbus McKinnon Chain Corp.*

323—Overhead Conveyor System. This 12-page catalog describes Chainveyor for handling light and medium loads up to 12 lb. Tells about its adaptability, low cost, long life, and ease of installation. Layout and component diagrams, application photos. *Chainveyor Corp.*

324—Floor Trucks. Catalog No. 140 (56 pages) presents trucks "for every handling need," and introduces trailers, barrel drain racks, and lever dollies. Trucks come in all steel, steel and wood, all wood. Guide shows how to select equipment. *Hamilton Caster & Mfg. Co.*

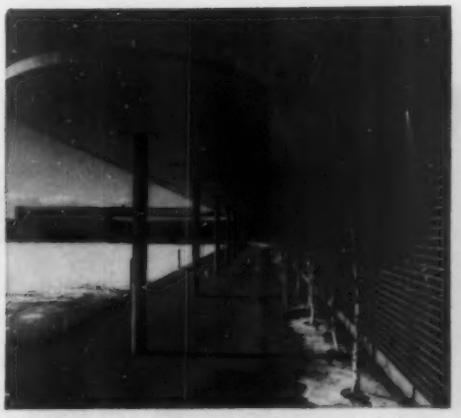
325—Grabs. These grabs can handle coils three different ways—by rim-gripping, core-entry, and diametral-gripping. Catalog G-3A tells how in 20 pages. Also describes other handling devices such as crane hooks, furnace cars, accessories. *Mansaver Industries, Inc.*

Turn the page

For more facts Circle 949 on Reader Service Card

For more facts Circle 950 on Reader Service Card ➤

One of the country's "TOP TEN" plants uses distinctive Natco clay brick



Appearance of building and grounds was one of the important selecting factors in the "top ten" competition.

Decorative and durable Natco black velour brick gives the Split Ballbearing plant in Lebanon, N.H., distinctive design. This plant (Division of Miniature Precision Bearings, Inc.) was designed by Carl Koelb & Associates, Architect, Weston, Mass.

Split Ballbearing's new plant in Lebanon, New Hampshire, was recently named one of the "top ten" plants constructed in the United States during 1958. Chosen by Factory Magazine, selection was based on beauty and utility. These qualities were needed in competing against more than 700 entrants.

One of the main considerations was the appearance of the plant exterior. Natco Ceramic Glaze Velour Brick was used on the outside wall construction. Versatile black velour brick serves a dual purpose. First, it is distinct in design . . . modern now *and* in the future. Second, it is durable . . . will help solve outside maintenance problems.

Velour brick is furnished in nine attractive colors, plus black and white. It is available in standard brick sizes and conforms to ASTM specifications. For more information, write for Circular CB-20 and Catalog S-60.

Beauty and utility . . . Natco velour brick has them both

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Perfectly safe on any surface!

MYCOLEUM all-purpose neutral liquid soap is kind to the most delicate tiles and resilients, yet gives real cleaning power and economy on all resilient, non-resilient and sealed wood floors. Its low-sudsing, free-rinsing properties keep time and labor costs down. And it's an ideal general purpose cleaner for wall, woodwork, and all painted surfaces.

Let Mike 'O clean up for you!

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FACTORY / CATALOG NEWS

Begins on page 308

For more about these items, circle item numbers on Reader Service Card next to back cover.

326—Conveyors. Two illustrated bulletins: No. 69 (12 pages) covers gravity and power conveyors designed for high-speed production. No. 151 (8 pages) describes the Recordlift, an automatic vertical conveying system "controlled by magnetic memory." *Standard Conveyor Co.*

327—Tractor Shovels. Four 4-pagers, Nos. 409-412, present Payloaders as follows: Model H-50 has operating capacity of 5000 lb.; H-70, 7000 lb.; H-90, 9000 lb.; H-250, 2500 lb. No. 416 (8 pages) on Model H-120 that's new in design and performance. *The Frank G. Hough Co.*

328—Containers. Here's a 6-pager, "Kennett Containers Handle Precision Products Better," that discusses the advantages of vulcanized fiber boxes. They cannot corrode, are strong, lightweight, and resilient. *National Vulcanized Fibre Co.*

329—Cranes. Whatever the need, this 30-page Bulletin CR-610 (2nd edition) is sure to help you select the right crane. Describes such equipment as box girders, bridge drives, trolleys, control panels. Gives clearance charts and operating speeds. *Ederer Engineering Co.*

330—Unit Load Handling. Corrugated box trucks, pallets, skid boxes, platforms, and accessories are described in 16-page Catalog No. 90. Illustrates three methods of dumping materials; gives specifications, and tells about cleaning and painting. *The Union Metal Mfg. Co.*

331—Addressing Systems. Two bulletins: No. A-120-R (16 pages), "How to Streamline Your Shipment for Speed and Economy," features ideas for addressing labels, tags, cartons. No. A-125 is a 6-pager, "49 Marking Jobs Done Faster, Easier . . ." *Weber Marking Systems.*

332—Pendent Switches. The safe switch for powered hoists has three pairs of pushbutton stations for hoist, bridge, and trolley control.

Turn the page

"Slickest visual control..." states *Factory* magazine. Entries made directly with marking pencil on a rolling "Mylar" sleeve which *moves with time,* bringing deadlines constantly closer. Entries easily erased with the swish of a cloth.

Send for **FREE GUIDE to Control Methods**
with full-scale, sample chart section

Shows how Rol-a-chart controls 22 different items: orders, production, data processing, maintenance, dispatching, sales, etc. Also expert consultation service with no obligation.

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MODELS

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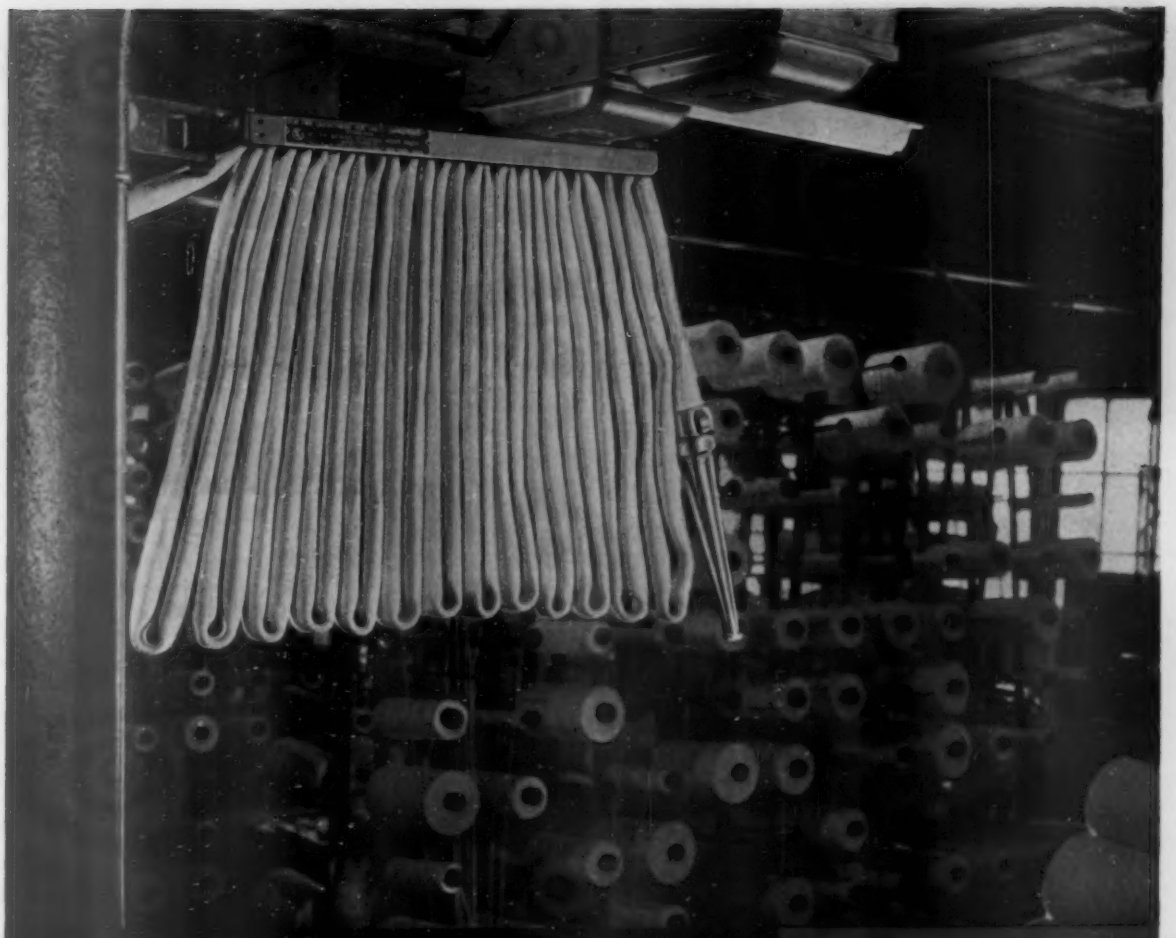

Is your hose ready to fight a fire today?

Acme-Hamilton's Eze-Pak is always ready and dependable. This hose is specifically built to be folded flat and reeled flat. Will store on all types of racks and reels. Eze-Pak Fire Hose will deliver all the water to the fire—it won't leak to damage costly material and equipment.

FACTORY MUTUAL APPROVED EZE-PAK Fire Hose was developed to meet the needs of industrial fire protection. The rubber tube is loose at the points of fold to prevent cracking. The single jacket of cotton and Dacron* is lightweight, durable and very flexible. 1½" size available in 50, 75 and 100 ft. lengths. Leakproof, easily dried. Write Acme-Hamilton, Dept. M for information.

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GET EXACTLY WHAT YOU WANT FROM THE MOST COMPLETE RANGE OF STORAGE AND MATERIAL HANDLING RACKS IN THE INDUSTRY!

Air-Row Head fully adjustable pallet racks.
SNAPS IN, LOCKS IN, NO LOOSE PARTS!

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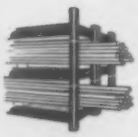

Bar, pipe and tube racks

Stock boxes —solid or KD

Portable stacking racks

If you have a special problem, we will design racks to your exact specifications.

METAL WORKING FACILITIES

EMI offers complete metal working facilities including tubular, structural and special shapes.

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FACTORY

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FACTORY / CATALOG NEWS

Begins on page 308

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Bulletin 79 (8 pages) tells about these and other new switches. Photos show front, back, and interior of the station. *Joy Mfg. Co.*

333—Fork Truck. This illustrated 4-pager (No. B-627) presents details about 6000-lb. capacity electric powered truck. The simple carbon pile control permits safe operation, better "inching" in tight places. Diagrams of two models. *The Elwell-Parker Electric Co.*

334—Strapping Machines. Round and flat steel strapping, strapping machines, and accessories are described in 20-pager (le-Uni). Questions answered include: Is your manually operated equipment adequate? Should you rent or purchase the machines? *U. S. Steel Corp.*

335—Addressing Systems. "Easy as A. B. C." says this 4-pager that tells all about the Sten-C-Labl systems for addressing multiple shipments. Photographs show various ways labels can be prepared—and they're sunproof and waterproof. Several sizes. *Sten-C-Labl, Inc.*

336—Trucks, Cranes. Two bulletins: No. 100 (4 pages) gives specifications and other data for Liftruk in 5- to 12-ton capacities. No. 103 (6 pages) tells about Lift-O-Krane, a one-man system for handling, shipping, storing bulk materials. *Silent Hoist & Crane Co., Inc.*

337—Power Take-Offs. Single-gear, two-gear, and reversible models are described in 4-page bulletin. Take-offs are lightweight, easy to install. Tables give capacities, breaking points, and drum cable in feet. Photos show "a winch for every purpose." *Vickers Inc.*

338—Material-Handling Program. This 24-page "How Book" discusses cost-cutting material handling. To help plan your program, company sells ¼-in. scale models of fork-lift trucks—visual aids that are sure to end up as desktop attention-getters. *The Yale & Towne Mfg. Co.*

At Ford Motor Company plant

RUBBISH DISPOSAL COSTS ARE NOW DOWN 66%

with Load Lugger System

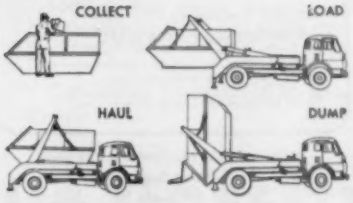
The Load Lugger system has not only reduced costs but has also greatly improved plant housekeeping at Ford Motor Company's Chicago Stamping Plant.

A Load Lugger equipped Ford truck services caster mounted Load Lugger containers of 14 cubic yards capacity which accumulate scrap lumber, garbage and plant refuse. The Load Lugger truck picks up and carries an average of eight container loads a day to the dump. There is no truck and driver stand-by time, in contrast to the former method. Now, the Load Lugger and driver easily take care of the plant's daily generation of refuse—at a cost two-thirds less than before.

Caster-equipped Load Lugger container of rubbish being moved from inside plant by tow tractor to where Load Lugger truck will pick it up.

Fork truck deposits rubbish in Load Lugger container which when full, will be picked up by Load Lugger truck.

Container load of rubbish on its way to the dump. Truck averages eight trips per day.



For the complete story, and to learn about the savings you can make with Load Lugger, telephone collect, Fireside 2-0136.

INGERSOLL-KALAMAZOO B-W BORG-WARNER

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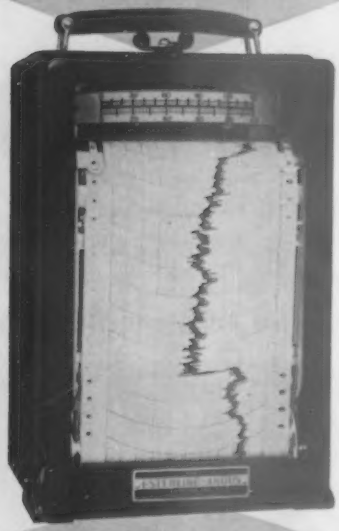
IZZITA

-AC Voltmeter? Yes

-AC Ammeter ? Yes

-DC Voltmeter? Yes

-DC Ammeter ? Yes



Yes, the handy

Esterline-Angus

Multi-Purpose

Recorder is all 4

Here are some of the more popular combinations in which this Recorder is available.

AC-DC Ammeter-Voltmeter
0-50 MA*, 0-5 A AC; 0-100 MV DC†; 0-150/300/600 V AC & DC.

AC Ammeter-Voltmeter
0-50 MA*, 0-5.0/10 A, 0-150/300/600 V.

AC-DC Ammeter
0-50 MA*, 0-2.5/5.0 A AC; 0-100 MV DC†.

AC-DC Voltmeter
0-150/300/600 V AC and DC.

*0-50 MA range for use with split-core current transformer having 50 MA secondary.

†0-100 MV range for use with 100 MV shunts.

Write us your requirements or send for Catalog Section 48.

The Esterline-Angus Company

No. 1 in fine Graphic Instruments for more than 50 years.

DEPT. S, BOX 596, INDIANAPOLIS 6, INDIANA

ADVERTISERS' LITERATURE

Offered in ads received up to 5th of last month. To get items you want, circle numbers on Reader Service Card next to back cover.

PLANT SITES

531—Industrial Sites. 112-page book lists 123 cities with latest industrial facts and sites. State of Minnesota.

532—Manufacturing Facilities. Plant-by-plant, machine-by-machine study of facilities. Northern Natural Gas Co.

533—Plant Sites. Free booklet, "Industrial Location Services," gives complete data. N. Y. State Dept. of Commerce.

534—Plant Sites. Facts on savings possible on industrial plant space in Western Pennsylvania. West Penn Power.

535—Plant Sites. Confidential report on available plant sites is free. Tidewater Virginia Development Council.

536—Plant Sites. Tells about new "100% Lease-Purchase Financing Plan" for plants. Rhode Is. Development Council.

537—Plant Sites. "Plant Location Guide and Available Property List" is available. Haverhill Industrial Council.

538—Plant Sites. Brochure on developing, building, and financing facilities. Northern Berkshire Development Corp.

539—Plant Sites. Report gives complete facts on plant sites available. Public Service Electric & Gas Co.

540—Plant Sites. Information on location, labor, power facilities. W. Va. Industrial Publicity Commission.

541—Plant Sites. Checklist (4 pages) of plant location data, plus financing plans. Maine Dept. of Economic Development.

542—Industrial Sites. Area brochures contain data on labor, transportation, taxes, etc. New York Central Railroad.

PLANT SERVICES

543—Fans, Blower/Exhaust. Bulletins FMB-935 and FI-110 provide complete data and sizes. Buffalo Forge Co.

544—Air Conditioning. Free cost-calculating formula and literature. Typhoon Air Conditioning Div., Hupp Corp.

545—Fans. Catalog 517 (36 pages) contains detailed information on ready-to-run "packaged" fans. Clarage Fan Co.

546—Air Conditioning. Booklet, "Will factory air conditioning pay off for me?", is free upon request. Carrier Corp.

547—Factory Furniture. Catalog illustrates diversified line of steel equipment. Lyon Metal Products, Inc.

548—Filters. Here's information on useful filter for removing oil, water, and dirt from air lines. Wilkerson Corp.

549—Waste Receptacles. Catalog lists full line, including new wall-hung types for limited areas. Bennett Mfg. Co.

550—Dust Collectors. Catalog 104 (36 pages) describes features of multi-type filter-bag units. W. W. Sly Mfg. Co.

551—Acoustical Booths. Bulletin No. A142-4T supplies model descriptions and prices for this line. Burgess-Manning Co.

552—Waste Disposal Units. Brochure describes private hauling service with specialized equipment. Dempster Bros.

553—Flexible Hose. Bulletin IEB-50 gives full information on performance of hose made of Teflon. Aeroquip Corp.

554—Safety Cans. Bulletin presents line of safety benzine cans, oily waste cans, and plunger cans. Justrite Mfg. Co.

555—Safety Eyeglasses. Booklet, "Eyes Are Expensive Targets," outlines protection program. American Optical Co.

556—Coagulant Aids. Bulletin HSP-919 tells how to improve water purification. Hagan Chemicals & Controls, Inc.

557—Hand Cleanser. Literature describes hand cleanser with special additive. West Chemical Products, Inc.

558—Dust Filter. Bulletin G-579 gives operating features, dimensions, specifications of this product. The Day Co.

559—Gas-Fired Heaters. Catalog has complete data on full line for specific applications. L. J. Wing Mfg. Co.

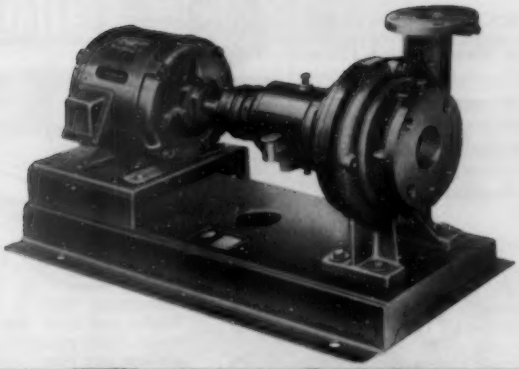
560—Industrial TV. Literature supplies information and guide to closed circuit TV in industry. Philco Corp.

561—Dust Separators. Bulletin 573 on Dual-Clone type. Noted for low resistance, high efficiency. The Day Co.

562—Fire Extinguishers. Brochure F-11 provides complete data on new all-class fire extinguishers. Alim Corp.

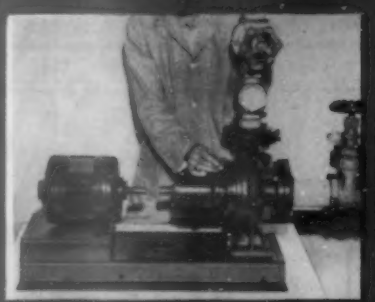
563—Compressors. Form No. 775 gives complete details on flexible multi-drive compressors. Dunham-Bush, Inc.

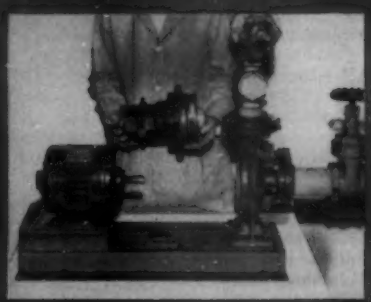
Turn the page



EASY TO SERVICE THIS VERTICAL SPLIT-CASE PUMP

B&G SERIES 1510-B CENTRIFUGAL PUMP





The photos show how easily the complete bearing frame, including seal and impeller, can be removed without disturbing piping or motor leads. The unit is replaceable and interchangeable in all pump sizes within limits of material construction.

Other features of the 1510-B include—

Mechanically balanced impeller. Balancing chamber and pressure relief holes in the impeller reduce thrust to a minimum, lengthening pump life.

Solid-type volute with support foot. Can be left in pipe line when servicing pump—rugged construction absorbs piping strains.

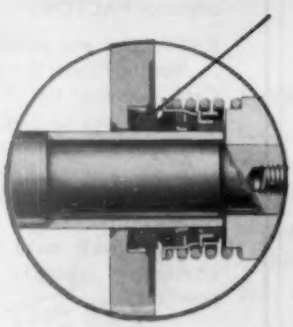
Anti-friction roller bearings. Timken bearings handle thrust and radial loads for smoother, quieter, more efficient operation.

Oil lubrication. No messy, undependable grease cups—circulating oil lubrication assures positive protection to bearings. Oil level indicator permits visual check.

Rugged steel base. Base mounted construction provides a sturdy platform for proper pump and motor alignment.

100% factory tested. Every pump hydraulically tested to meet specified conditions of head and capacity.

Capacities. To 2000 GPM, heads to 420 ft.



LEAK-PROOF "REMITE" SEAL

This exclusive feature assures long, trouble-free life—eliminates the customary leakage which occurs when a packing gland is used. A carbon seal ring faces on a "Remite" floating seat —a material developed by B&G, so hard it will scratch glass—wear-proof and corrosion-resistant.

This mechanical seal is self-lubricating. A synthetic rubber bellows seals the shaft. Metal parts are of steel, bronze or stainless steel, depending upon the type of service.

STOCK PUMPS FOR QUICK SERVICE

Selected sizes of B&G Series 1522, 1531 and 1510-B Centrifugal Pumps are stocked at the factory for immediate shipment. Capacities to 550 GPM, heads to 180 ft. Send for Price and Selection Catalog.

Reg. U.S. Pat. Off.

BELL & GOSSETT COMPANY

Dept. GE-13, Morton Grove, Ill.

Canadian Licensee: S. A. Armstrong Ltd., 1400 O'Connor Drive, Toronto 16, Ontario

With "Ship To" frame pre-printed by carton maker, shipping clerk uses Multistamp Duplicator to address up to 1000 pieces of the same shipment with the same low-cost stencil . . identically, accurately, quickly, easily.

Using Multistamp FORM-CUT stencil, printing the form and fill-in data at the same time is an easy, one-man, one-hand operation. Your form is custom die-cut in the stencils . . . you fill them in with ball point pen or typewriter.

MULTISTAMP **Stencil Addressing System**

Quickest Way for

Volume Shipping

EASY-TO-READ FADE PROOF — **QUICK DRYING WATERPROOF**

Shipping department addressing errors are virtually eliminated when address and routing information are printed directly on cartons by the Multistamp Stencil Duplicator. The print becomes an identical smear-proof . . fade-proof . . water-proof . . permanent part of every carton. Following simplified Multistamp Marking Methods, the address stencil is cut in the same typing which fills out shipping order, bill of lading, invoice, and other forms. One typing . . one easy operation.

Write Today for your Free copy of the illustrated new how-to-and-why book about the Multistamp Marking Methods.

MULTISTAMP
STENCIL DUPLICATOR (R)
THE MULTISTAMP CO. NORFOLK, VA.

ADVERTISERS' LITERATURE

Begins on page 420

Offered in ads received up to 5th of last month. To get items you want, circle numbers on Reader Service Card next to back cover.

564—Filters. Bulletin F-75 has specifications, layouts; capacity and performance tables for a-c filter. The Day Co.

565—Storage Cabinets. Descriptive literature on modular steel storage units for spare parts, tools. Vidmar, Inc.

566—Washfountains. New catalog (6002) contains data on washroom facilities. Bradley Washfountain Co.

567—Fire-Alarm System. Fire-alarm system planning guide details installation, performance, and price. Gamewell Co.

568—Rotary Valves. Bulletin N-578 has construction features, specifications, dimensions, applications. The Day Co.

569—Padlocks. Catalog lists complete line of padlocks for every industrial use. Master Lock Co.

570—Meters. Bulletin 43 gives data on high-pressure, steam-jacketed and Electricontact models. Buffalo Meter Co.

571—Unit Dust Collectors. Bulletin 510 covers units for use where central systems are not practical. The Day Co.

572—Rotary Compressors. Literature describes spare parts kit for rotary compressors. Allis-Chalmers Mfg. Co.

573—Unit Work Benches. Catalog lists full line with interchangeable accessories. Columbia-Hallowell Div.

574—Industrial Fans. Bulletin I-585 has selection charts, capacity tables, dimensions, specifications. The Day Co.

BUILDING

575—Metal Buildings. Data Book BD-959-9 covers top-quality, fire-resistant buildings. Parkersburg Rig & Reel Co.

576—Steel Pipe Piling. Catalog (16 pages) gives details on foundation products. Armco Drainage & Metal Products.

577—Roof Deck. Catalog 240 presents data and features of bonderized steel roof deck. Inland Steel Products Co.

578—Fir Plywood. Tells all about fir plywood—its uses, properties, and advantages. Douglas Fir Plywood Assn.

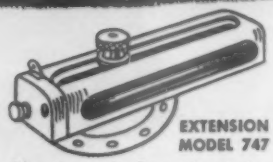
579—Wall Panels. Catalog 243 gives complete structural data and features of product. Inland Steel Products Co.

Turn the page

"ON-THE SPOT" **EFFICIENCY**

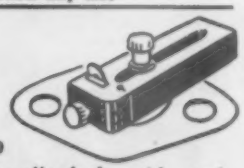
SPEARHEAD GASKET CUTTERS

H A N D • T O O L S



EXTENSION MODEL 747

Aluminum body with steel blades and inch and metric scales. Cuts precision round gaskets any size



HANDY MODEL 750

Phenolic body with steel blades and inch and metric scales . . . cuts round gaskets ¼" to 6", odd shapes and straight pieces any size

ZIMMERMAN PACKING

2768 HIGHLAND AVE. NORWOOD 12, OHIO

NEW YORK OFFICE 120 LIBERTY ST. NEW YORK 6, N. Y.

CHICAGO OFFICE 6201 N. PULASKI RD. CHICAGO 46, ILL.

Circle 959 on Reader Service Card

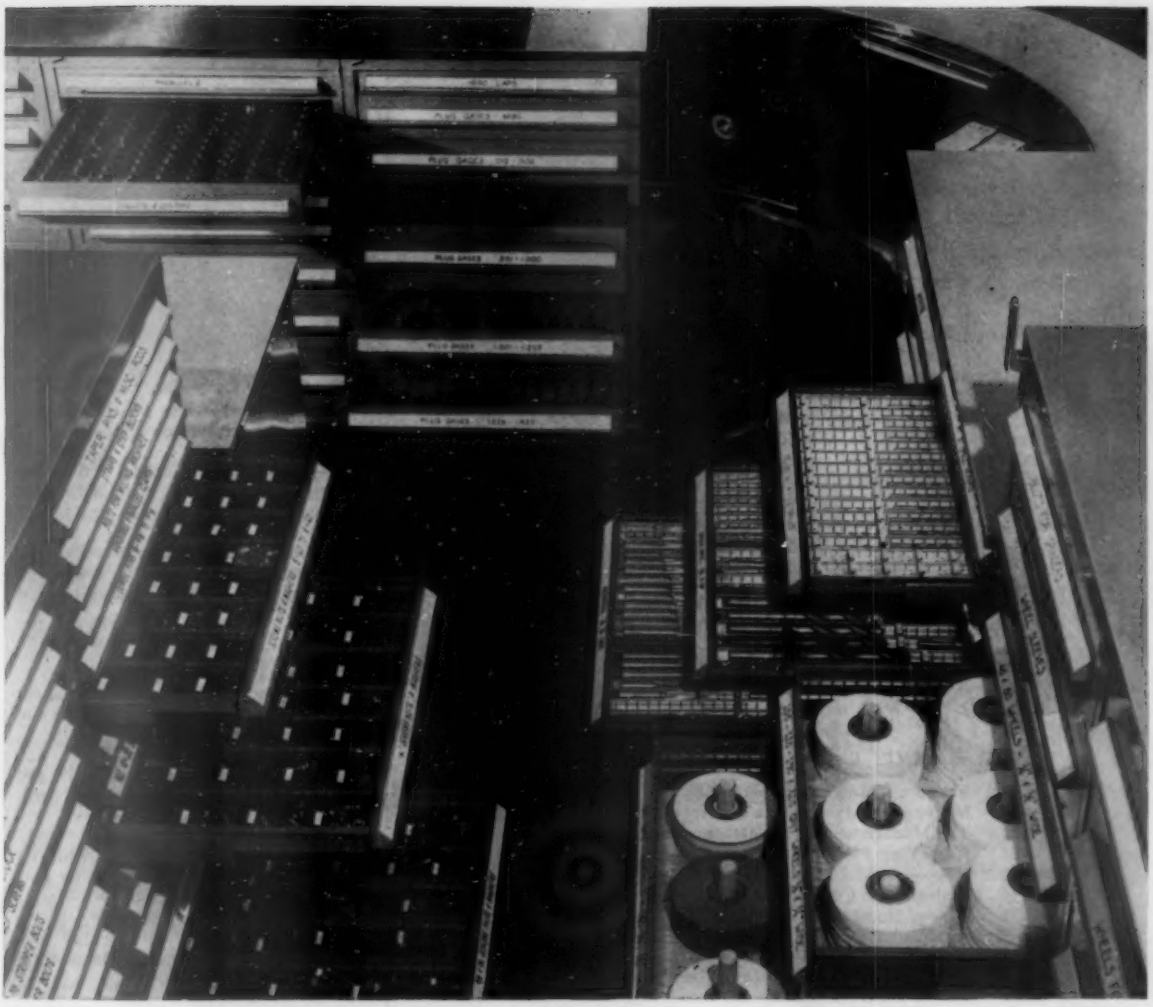
IF You Change Your Address

please be sure to let us know promptly. It takes time to correct the stencil addressing plate. And we don't want you to miss copies of FACTORY.

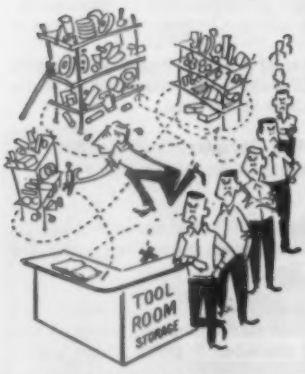
EASY, quick way to tell us . . . use the Reader Service Card opposite the back cover. Be sure to give us both your *old* address and your *new* address, including your postal zone number. Drop the card in the mail and we'll make the change as quickly as possible.

FACTORY

330 WEST 42ND ST., NEW YORK 36, N. Y.



This storage space makes money



THIS ONE DOESN'T. *Outdated storage—disjointed, harum-scarum—keeps skilled workers waiting needlessly. Everything hard to see, hard to find, hard to keep track of.*

HOW? By putting more spare parts, tools, gages, fixtures, assemblies and components into a given area than could possibly be fitted into outdated tool cribs or storage bins. And by keeping them close at hand, fully visible...absolutely safe from damage, loss, dust or pilferage.

Vidmar industrial storage units are of heavy gauge steel. Cabinets come in various heights, and so do drawers—which can be partitioned in unlimited arrangements. Drawers are strong, holding up to 400 lbs. each! All units are modular...can be moved, interchanged, re-arranged, and added-to as required from year to year.

BEFORE YOU revise or add to your storage facilities, it will pay you to check Vidmar industrial storage units. Write today for descriptive literature. VIDMAR, INC., 2325 Reach Road, Williamsport, Pa.

Store more...better...in less space with

Vidmar CABINETS

Division of VOLKERT STAMPINGS, INC.

For more facts Circle 960 on Reader Service Card

Maintenance Ideas

They'll save dollars for you—dollars that will add up fast. And where can you find these ideas? In FACTORY reprints, of course. The list below tells you the titles we carry in stock. To get the ones you want, order (by code number and title) from FACTORY Reader Service, 330 W. 42nd St., New York 36. Send cash or check. Or ask us to bill you. Now scan the list below.

35 CENTS EACH

A14 Universal Maintenance Standards
A15 18 Ways to Cut Maintenance Costs
A119 Making Your Dials Read Right
A127 Plant Site Selection Guide
A128 Getting Answers to Maintenance Training Questions
A129 Slicing Maintenance Labor Costs
A131 Better Way to Rate and Pay Maintenance Workers
A139 What Planned Maintenance Means to Me
A148 18 Checks on Maintenance Costs
A151 Slashing Roof Repair Costs 30%
A158 16 Soft Spots in Maintenance Costs
A159 How to Make a Maintenance Audit
A173 How to Audit Obsolescence
A177 How to Divvy Up New-Plant Money
A179 What You Will Pay for What You Want in Your New Plant
A183 Maintenance Plan to Fit Any Plant
A201 A Pro Looks at Maintenance Cost Reduction
A224 2 New Ways to Measure Maintenance Efficiency

50 CENTS EACH

A20 Measure Maintenance Performance
A21 Mechanized Maintenance Control
A22 The Management of Maintenance
A24 Keep Your Plant Up — Costs Down
A25 How to Build a Maintenance Program Now
A26 Maintenance Control That Really Controls
A27 How to Boost the Maintenance Department's Productivity
A28 What Should Maintenance Cost?
A29 How to Find & Control Your Maintenance Costs
A31 Best in Plant Maintenance
A33 Select the Right Floors
A34 Install Floors for Long Life
A35 Make Floors Last Longer
A106 Preventive Maintenance
A180 Better Maintenance Stores (3 articles)
A187 What Industry Is Spending for Maintenance
A193 159 Ways to Build Low-Cost Maintenance into Your Plant
A208 Maintenance by Contract
A211 How To Organize for Better Maintenance

PLANT SERVICES

35 CENTS EACH

A161 Those Hidden Handling Costs
A166 How to Save Real Money on Power
A169 Let Lights Burn — or Turn 'em Off?
A171 The Whole Story on Water Costs
A178 Puzzled About Buying Motors?
A200 Hitting the High Cost of Handling
A202 16 Signs of Power Trouble
A205 Getting Your Best Plant Layout

50 CENTS EACH

A43 Adopt the Best in Plant Layout
A134 Static Electricity — $100-Million Headache
A162 Electrical Management & Maintenance Practices Today (Survey of 329 plants)
A221 Spot Heating

ADVERTISERS' LITERATURE

Begins on page 420

Offered in ads received up to 5th of last month. To get items you want, circle numbers on Reader Service Card next to back cover.

580—Floor Grating. New catalog provides structural data and suggests varied applications. The Globe Co.

581—Wood Block Floors. Literature gives installation data and performance features. Jennison-Wright Corp.

582—Glass Fiber Panels. Case histories and new glazing folder (SL-1) available upon request. Structoglas, Inc.

583—Track Rail. Catalog FA-5 lists complete line of track with accessories and tools. L. B. Foster Co.

584—Glass. New catalog describes patterns, has light distribution charts and transmission data. Mississippi Glass Co.

MECHANICAL

585—Timing Belt Drives. New engineering manual gives complete facts on timing belt drives. R. & J. Dick Co.

586—Speed Reducers. Book 2719 provides mechanical data and sizes of parallel shaft types. Link-Belt Co.

587—Pillow Blocks. New Bulletin 106 has sizes of ball-bearing unit, other data. Hoover Ball & Bearing Co.

588—Bearing Units. Bulletin 359 gives information on "I" series of flange units. Sealmaster Bearings Div.

589—Motoreducers. Bulletin 3100 tells about units up to 75 hp. with output speeds of 780 rpm. to 1.2 rpm. Falk Corp.

PRODUCTION

590—Plate Magnets. Complete data covers series 17 separators to protect machinery and production. Eriez Mfg. Co.

591—Visual Control Board. Free guide with full-scale sample chart section. Conley, Baltzer & Steward.

592—Heat Transfer. Bulletin P60 presents complete descriptive data and applications. Tranter Mfg., Inc.

593—Air Drills. Bulletin 53B gives detailed information on new air drill. The Rotor Tool Co.

594—Honing Machine. Literature supplies performance data and prices on new honing machine. Superior Hone Corp.

595—Flexible Connectors. Catalog 1D-100C has details on all-metal flexible connectors. Universal Metal Hose Co.

Turn the page

During our periodic fire drills at Gillette, a Gamewell fire alarm system has proved itself much faster, much more trouble-free than the one it replaced. We appreciate the excellent protective value of the Gamewell system and your aid in engineering it to cover all buildings in our plant area.

Howard P. Spaulding
Chief Electrical Engineer
Gillette Safety Razor Co.
Gillette Park, Boston, Mass.

At Gillette it's GAMEWELL

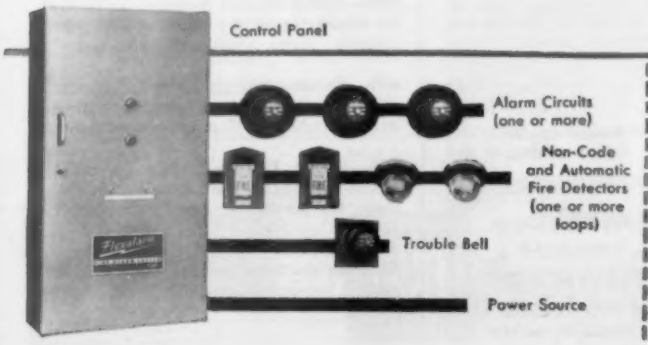
. . . industrial leader installs the leading fire protection system

The Gamewell system endorsed by Engineer Howard Spaulding was carefully designed to protect all lives and property in Gillette's 11 buildings — headquarters of the internationally known manufacturer of razors, blades and other products.

A Gamewell system can be engineered to safeguard your own business from fire losses — including not only irreplaceable human lives but buildings and equipment that can't be renewed at their original costs. It will warn all personnel, signal your local fire department and, if required, will include fire detection units that activate the entire system — instantly — automatically.

Ask your Consulting Engineer about these advantages. Also, a Gamewell Fire Protection Engineer will be glad to give you details about installation requirements, performance and price. Send the coupon below for this service and/or a Gamewell technical manual — without obligation.

Gamewell
FIRST . . . WHEN SECONDS COUNT!


Control Panel
Alarm Circuits (one or more)
Non-Code and Automatic Fire Detectors (one or more loops)
Trouble Bell
Power Source

GAMEWELL CO., Dept. 6C
1604 Chestnut Street
Newton Upper Falls 64, Mass.

☐ Have a Gamewell Fire Protection Engineer call
☐ Send me a Gamewell Fire Alarm System Planning Guide

Name.....
Title.....
Firm.....
Address.....
City.....*Zone*....*State*...

For more facts Circle 961 on Reader Service Card

What BRONCO PATENTED* branding means to you!

You know your electrical cords and cables are the toughest you can get when you find this name molded* indelibly into the outer 67.32% Neoprene jacket.

YOU KNOW YOU ARE GETTING WHAT YOU ORDERED

67.32% NEOPRENE TYPE W 3 COND #8

HIGHEST NEOPRENE CONTENT IN THE INDUSTRY to give your cable maximum protection from oil, heat, acid, abrasion, etc.

TYPE AND SIZE are molded* into the jacket as well as rated voltage & "P116BM," Bureaus of Mines official approval number.

SELF-MEASURING — Branding* is repeated every two feet exactly. Want 20 feet? Count 10 Broncos and cut.

Write for free sample!

*U.S. PATENT #2867001

WESTERN INSULATED WIRE CO., LOS ANGELES 58, CALIF.

For more facts Circle 962 on Reader Service Card

FREE

WHOLESALE CATALOG

Gifts • Premiums • Prizes

740 Pages • 20,000 Items

Furniture • Radio • Jewelry • Luggage
Hardware • Electrical • Housewares
Sporting Goods • Automotive

Clip This Ad To Your Letterhead and Mail To Dept. C

CONTINENTAL PRODUCTS, INC.

2030 S. Michigan Ave., Chicago 16, Ill.

NOW! IMPROVE PRODUCTION — LOWER MAINTENANCE COSTS

with

K-LENS-M

BETTER VISION PRODUCTS

The Modern Liquid Method that Cleans Glass or Plastic at Lower Cost per Cleaning.

The K-Lens-M Goggle Cleaning Station cuts down maintenance time for refilling; holds 1400 K-Lens-M lens tissues; dispensing one sheet at a time; holds full 16 oz. bottle of K-Lens-M lens cleaner.

Request 30-day FREE Trial Offer

The WILKINS Co., Inc.
Cortland 41, N. Y.

Wise to Choose — Safe to Use

© Copyright, The Wilkins Co., Inc. 1959

ADVERTISERS' LITERATURE

Begins on page 420

Offered in ads received up to 5th of last month. To get items you want, circle numbers on Reader Service Card next to back cover.

596—Air Motors. "Spot-A-Mation File" contains wiring diagrams, installation data, etc. The Bellows Co.

597—Schedule Board. Booklet X-300 (24 pages) shows application of visual control schedule board. Graphic Systems.

598—Photoelectric Controls. Brochure NP-5 gives data on automatic industrial processes. Standard Instrument Corp.

599—Dual Riveter. Bulletin HRD-4-59 gives complete information on new hydraulic riveter. Tomkins-Johnson Co.

600—Screwdriving Tools. Catalog 30-C lists all standard and magnetic types. The Apex Machine & Tool Co.

601—Hose. Bulletins M620, M694 cover hose for handling air, water, other fluids and gases. Raybestos-Manhattan, Inc.

MAINTENANCE

602—Floor Polishes. York report covers slip- and scuff-resistant, dirt-repellent products. Walter G. Legge Co.

603—Lubricating Devices. All about new "tri-duty" airline controls for lubrication. Alemite Div., Stewart-Warner Corp.

604—Rust Preventive. Full-color catalog on new color horizon system, with charts and applications. Rust-Oleum Corp.

605—Floor Machines. Literature describes line of job-fitted equipment for floor maintenance. Finnell System, Inc.

606—Paint. Free booklet, "How To Save Safely When Painting Your Plant," for the asking. Sherwin-Williams Co.

607—Vacuum Units. Learn about the materials this equipment reclaims or removes. Invincible Vacuum Cleaner Mfg. Co.

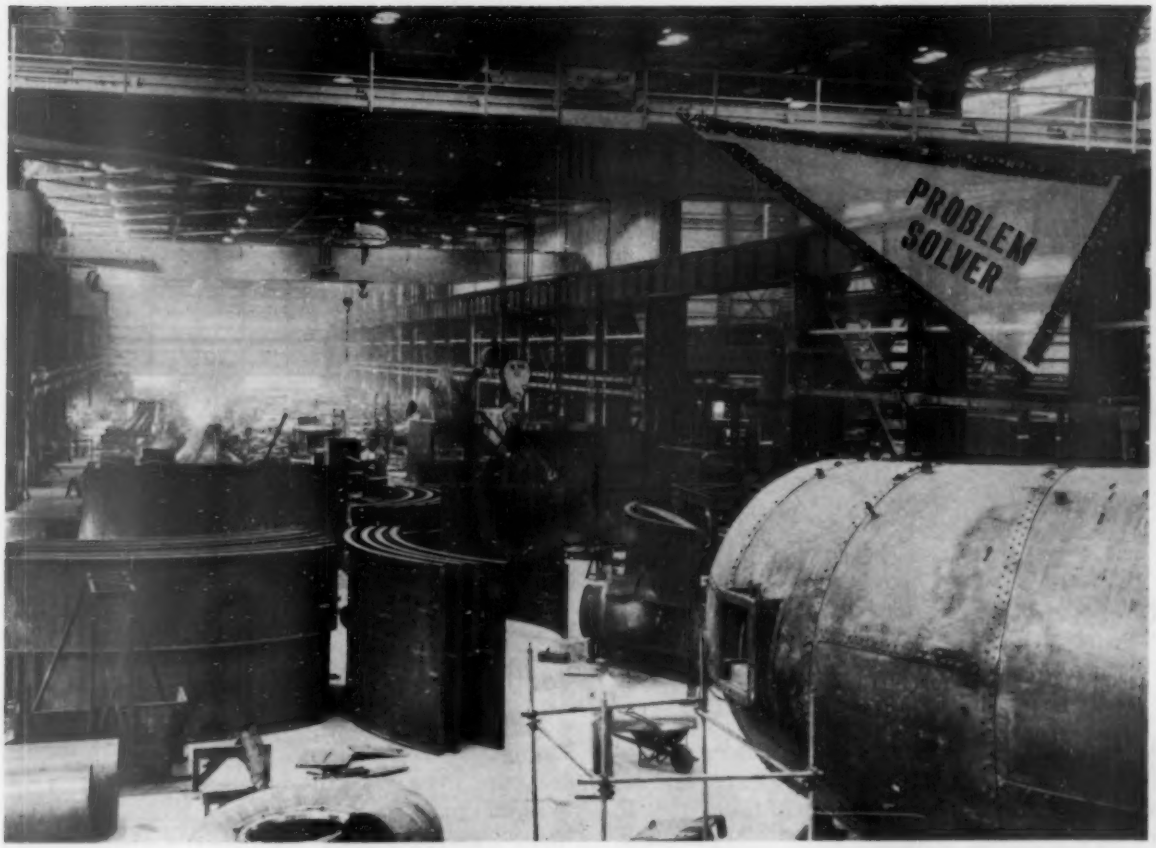
608—Visible Record Systems. Literature on mistake-proof preventive maintenance systems. Acme Visible Records, Inc.

609—Building Maintenance. Information about work standards system maintenance. Industrial Sanitation Counselors.

610—Epoxy Finishes. Data on tough, flexible, chemical- and acid-resistant coatings. Hauger-Beegle Associates, Inc.

611—Machine Mounts. Booklet gives facts on machine mounts. No bolts or cement needed. Clark-Cutler-McDermott.

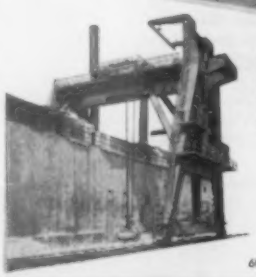
Turn the page



Production gets a multiple-shift lift from Shaw-Box® Cranes

Series "D" Shaw-Box Crane. For average industrial service. Components are mass produced to permit lower prices. Capacities to 20 tons. Spans to 80 feet. Selection of type, size, span, and control can be made from a catalog.

Type "SC" Shaw-Box Crane Bridge for heavy duty service with standard "SC" trolley. Rigidly constructed to eliminate whipping and skewing. Crane has highest hook lift. Capacities to 40 tons.



Shaw-Box Bucket Magnet Crane. This type has special advantages in steel mill services. Shaw-Box builds cranes of every type in every capacity to 500 tons.

60 D-1

At York, Pa. Allis-Chalmers Manufacturing Company engineers the unusual in hydrodynamics. Giant hydraulic turbines and their accessory water control equipment are designed and produced here.

Two 25-ton Shaw-Box Cranes help solve some of the tough handling problems in Plant No. 2. They carry steel plates and castings to and around in the fabricating area for layout and processing into subassemblies of draft tube liners, spiral casings, pit liners, and special products.

Multiple shifts are normally working at Plant No. 2. The cranes operate under diverse conditions. At one moment, each may be handling a piece that's too heavy for a man. Then both cranes may work together at their combined capacities. Clearing the largest assemblies is no problem for these low headroom cranes.

Shaw-Box Cranes are solving overhead load handling problems for all industry. Whatever type and capacity you require, Shaw-Box will engineer and build your crane to give the utmost in performance, economy, and safety. Your inquiry is invited.

MANNING MAXWELL & MOORE TRADE MARK

SHAW-BOX CRANES

A Product of

MANNING, MAXWELL & MOORE, INC.

Shaw-Box Crane & Hoist Division • Muskegon, Michigan

In Canada: Manning, Maxwell & Moore of Canada, Ltd., Galt, Ontario

the question is time

During the past few years, the cancer cure rate has increased from one in four saved to one in three saved: 40,000 more lives saved each year. During the next few years, there will no doubt be new methods of diagnosis, and even cures for some cancers that are considered incurable today. In time, the ultimate goal, cancer prevention, will be achieved. But time alone will not do the job. ● Time plus research will. Research costs money. In the past 14 years, the American Cancer Society has spent about $76,500,000 on cancer research. Much more is needed to accomplish the final conquest of this dread disease. Give generously. Send your contribution to "Cancer," in care of your local post office.

AMERICAN CANCER SOCIETY

the answer is money

ADVERTISERS' LITERATURE

Begins on page 420

Offered in ads received up to 5th of last month. To get items you want, circle numbers on Reader Service Card next to back cover.

612—Washroom Service. Free literature describes washroom program. Demonstration available. West Chemical Products.

613—Vacuum Cleaners. Here's descriptive sheet on air jet cleaners, compressed air-powered. Spencer Turbine Co.

614—Paint. Booklet, "How to Put Color to Work" (28 pages) in maintenance painting. E. I. du Pont de Memours & Co.

615—Soap. Information covers all-purpose neutral liquid soap for delicate tiles and resilients. Masury-Young Co.

616—Masonry Adhesives. Bulletins describe adhesive coatings for new or old masonry surfaces. Swift & Co.

617—Lubricants. New book, "Organized Lubrication—Major Cost Control Factor," free upon request. Texaco, Inc.

618—Paint. Free booklet, "Color Dynamics," plus survey of your plant now available. Pittsburgh Plate Glass Co.

619—Grass Mowers. Free "Mowing Magic" folder describes three riding-type sizes of mowers. Clean-Cut Mowers, Inc.

620—Floor Safety. Free literature and demonstration on making floors slip-resistant. West Chemical Products.

621—Washroom Maintenance. Facts on new soap formula for cleaning, sanitizing, disinfecting, etc. Sugar Beet Products.

622—Rust Preventives. Two helpful charts for protecting metal surfaces in storage and shipping. Valvoline Oil Co.

ELECTRICAL

623—Magnetic Starters. Free color bulletin (14-B1) supplies data on line and applications. Furnas Electric Co.

624—Substations. Bulletin 3104-1A gives complete information on value-packed line. I-T-E Circuit Breaker Co.

625—Graphic Recorder. Catalog Section 48 describes multi-purpose ammeter-voltmeter. Esterline-Angus Co.

626—Pendent Switches. Illustrated literature covers 2-, 4-, 6-button models, rubber-encased. Joy Mfg. Co.

627—Silicone Insulation. Booklet, "Specify Silicone Insulated Motors and Transformers and Save." Dow Corning Corp.

Turn the page

NATIONAL TRAINING LABORATORIES

announces

6th ANNUAL MANAGEMENT WORK CONFERENCE PROGRAM

Arden House, Columbia University's Harriman Campus, Harriman, N. Y.

November 27–December 9, 1960
January 22–February 3, 1961
March 19–31, 1961

An intensive 2-week seminar for corporate executives, department heads, and staff men . . .

. . . a unique opportunity for American business executives to participate in a laboratory experience aimed at improved abilities to deal with the difficult problems of human management in today's business.

write **NATIONAL TRAINING LABORATORIES**
NATIONAL EDUCATION ASSOCIATION
1201 - 16th St., N.W., Washington 6, D.C.

For more facts Circle 966 on Reader Service Card

***NEW!* Wall-Hung Waste Receptacle**

Attached easily to the wall, it cannot be pushed around or knocked over. Access to liner by key only — no scattering of contents by vandals or mischief-makers. Removal of liner is easy — just open hinged door and slide out. Valuable in areas where floor space is limited.

WRITE FOR FREE CATALOG

BENNETT
MANUFACTURING CO., INC.
DEPT. 58 ALDEN, N. Y.

Also makers of the original step-on receiver . . .

TRADE MARK
SANI-CAN
PATENTED

For more facts Circle 967 on Reader Service Card

You Asked for It !

Here it is at only

$495.00

The NEW SUPERIOR MODEL "J2" Honing Machine

Automatic honing in production runs, tool room work and salvage operations is now within the reach of everyone.

FEATURES:

- ★ Infinitely variable spindle speeds (225—525 rpm standard; 450—1050 rpm optional.)
- ★ ½ HP, 110-V, 60 cy. single phase motor.
- ★ Complete drive, motor and removable 14-gal. coolant tank enclosed in ventilated heavy steel base.
- ★ Tray top. ★ Sealed ball bearing spindle. ★ Anti-splash screen. ★ Splash guards.

OPTIONAL:

- ★ Dial indicator.
- ★ Full width extension tray.
- ★ Filter tray with 3 settling baffles and burlap filter.

There's a Superior Honing Machine for Every Honing Job

Send for literature and prices

SUPERIOR HONE CORPORATION
1617 ELRENO STREET ELKHART, INDIANA

For more facts Circle 968 on Reader Service Card

5 ft. high

weighs

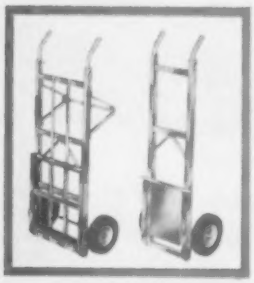
only 35 lbs.

Although made for heavy warehouse duty—it is easily handled by one person

If storage is a problem . . . order the folding model.

Made of high tensile strength aluminum alloy. Extra bracing and riveting. Extremely strong, yet lightweight. Roomy, non-slip type steps and platform. Handy platform and hand rails. Rubber front feet and rubber tire casters on rear legs. Surpasses ASA and MLA standards.

NEW!
Aluminum Utility Truck with folding platform



Aluminum Ladder Co.
West Darlington Street Ext.
FLORENCE 7 S. CAROLINA

430 Circle 969 on Reader Service Card

ADVERTISERS' LITERATURE . . . *Begins on page 420*

Offered in ads received up to 5th of last month. To get items you want, circle numbers on Reader Service Card next to back cover.

628—Magnetic Starters. Here's useful information on magnetic starters with one-piece overload relays. Square D Co.

629—Motors. Bulletin 270A, Electric Motor Application Guide, gives data on complete line. Century Electric Co.

630—Safety Switches. Latest bulletin has information features of visible blade construction. Square D Co.

631—Fuses. Bulletin LPS on low-peak fuses available in sizes 15 to 600 amp., 250 and 600 volts. Bussmann Mfg. Co.

632—Electronic Tubes. Booklets: "Industrial Tubes" and "Gold Brand Reliable Tubes." Sylvania Electric Products.

633—Lighting Equipment. New 1960 edition of the RLM specifications book is available. RLM Standards Institute.

MATERIAL HANDLING

634—Electric Hoists. Brochure 577H lists line of midget link chain electric hoists. Yale & Towne Mfg. Co.

635—Tote Boxes. Catalog presents line of tote boxes, racks and dollies for food handling. Wear-Ever Aluminum, Inc.

636—Vibratory Feeders. Free comprehensive literature covers special units for dusty locations. Eriez Mfg. Co.

637—Dumpers. Catalog A-7 describes line: heights, 1-50 ft.; capacities, 100-5000 lb. Conveyors & Dumpers, Inc.

638—Lifters. Free illustrated catalog gives full data, including applications, of crank-up lifter. The Colson Corp.

639—Truck Rental Service. Folder tells story on leasing plan for industrial trucks. Ryder Truck Rental, Inc.

640—Batteries. Cost calculator determines advantages of electric-powered trucks. Electric Storage Battery Co.

641—Slings. New handbook tells all about slings from A to Z—types, dimensions, rated loads. Union Wire Rope Corp.

642—Steel Strapping. Free copy, "How To Save Money on Your Baling Operations." Signode Steel Strapping Co.

643—Tractor-Shovels. Bulletin 424 covers line of 20 models, 2000 to 12,000-lb. capacities. Frank G. Hough Co.

644—Trolley Conveyors. Book 2330 provides complete mechanical data and varied applications. Link-Belt Co.

645—Fibre Containers. Bulletin 0-6 lists sizes and styles for any handling need. National Vulcanized Fibre Co.

646—Conveyors. Catalog 935 describes full line of material-handling and processing equipment. Jeffrey Mfg. Co.

647—Screw Conveyors. Book 2989 contains full details, including complete range of components. Link-Belt Co.

648—Shelving. Free booklet, "How to Solve Your Storage Problems," for storage layout purposes. Equipto.

649—Conveyor Belt. Bulletin M303 gives data and features of belt for 45 idlers. Raybestos-Manhattan, Inc.

650—Tiering Truck. Bulletin on reach-fork electric tiering truck; 2000- to 3000-lb. capacities. The Raymond Corp.

651—Steel Shelving. Catalog gives complete data and features of this line of shelving. Borroughs Mfg. Co.

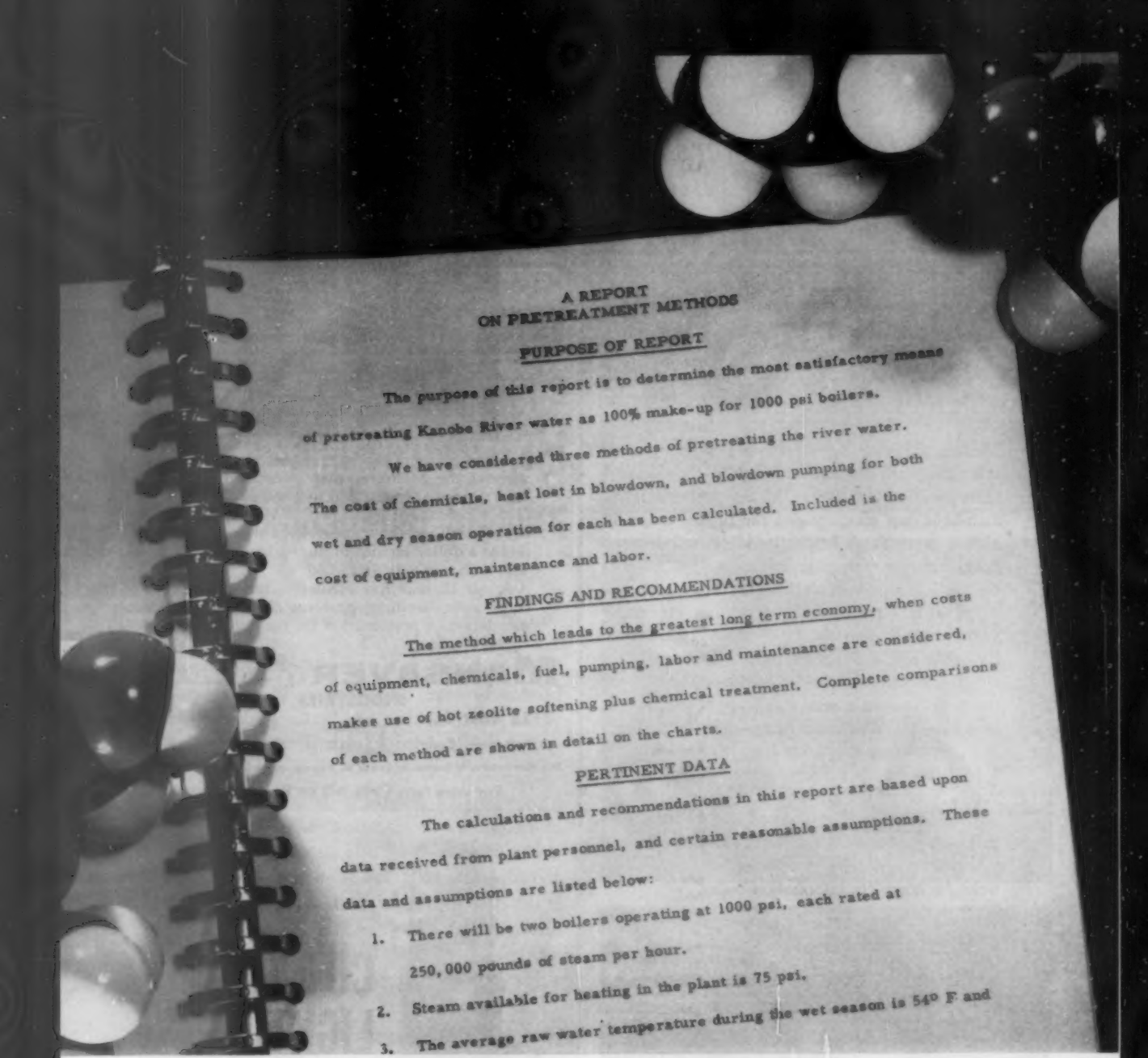
652—Storage Racks. Latest literature gives full data, features, and varied applications. Palmer-Shile Co.

653—Truck Tires. Here's information on maker's free "Tire and Wheel Analysis Plan." B. F. Goodrich Co.

654—Stencil Duplicator. New illustrated how-to and why book about multistamp marking method. The Multistamp Co.

Helpful Facts on Site Selection

Plant location is an infrequent—but immensely important—plant management job. FACTORY has the help you need to do the job right. It's in the form of a reprint that contains a comprehensive listing of factors you must consider in site selection, coupled with a simple but effective plan for evaluation. Developed for the May 1957 issue of the magazine, the article has been reprinted several times since then in response to requests from more than 3000 readers. Single copies of these reprints are available at 35 cents (quantity prices on request). Write Reader Service Department, FACTORY, 330 West 42nd St., New York.


A REPORT
ON PRETREATMENT METHODS
PURPOSE OF REPORT
The purpose of this report is to determine the most satisfactory means
of pretreating Kanobe River water as 100% make-up for 1000 psi boilers.
We have considered three methods of pretreating the river water.
The cost of chemicals, heat lost in blowdown, and blowdown pumping for both
wet and dry season operation for each has been calculated. Included is the
cost of equipment, maintenance and labor.
FINDINGS AND RECOMMENDATIONS
The method which leads to the greatest long term economy, when costs
of equipment, chemicals, fuel, pumping, labor and maintenance are considered,
makes use of hot zeolite softening plus chemical treatment. Complete comparisons
of each method are shown in detail on the charts.
PERTINENT DATA
The calculations and recommendations in this report are based upon
data received from plant personnel, and certain reasonable assumptions. These
data and assumptions are listed below:
1. There will be two boilers operating at 1000 psi, each rated at
250,000 pounds of steam per hour.
2. Steam available for heating in the plant is 75 psi.
3. The average raw water temperature during the wet season is 54° F and

They planned for minimum water costs...

by calling on the wide ranging experience that is one of Hall Laboratories' major assets.

Look at the report quoted above, prepared for a leading chemicals company. Hall drew upon intimate knowledge of water conditions and boiler characteristics to come up with a recommendation that will provide the best treatment method at the lowest, long-term cost.

Hall experience is by no means limited to boiler water treatment. The same realistic approach, based on firing-line information and aimed at efficient, low-cost water usage, is available on any of the multitude of ways water is employed in industry.

Hall Laboratories can help you find how to save money on water—your most important raw material.

HALL LABORATORIES

HAGAN CENTER, PITTSBURGH 30, PA.

Consultants on Procurement, Treatment, Use and Disposal of Industrial Water

Write for new booklet describing Hall Laboratories' plant-wide water services.

DIVISION OF **HAGAN** CHEMICALS & CONTROLS, INC.

For more facts Circle 970 on Reader Service Card

fewer workers can clean your building

CLEANER – AT LESS COST...

with the ISC Work Standards System!

Modern cleaning equipment is not enough:—it takes the Work Standards System to cut costs and raise productivity. Today, higher production per man-hour has compensated for higher wages in almost every field. In the building maintenance field, however, the productivity of the average cleaner has remained static.

Industrial Sanitation Counselors has, for twenty years, studied the problems of building sanitation. By applying the Work Standards System, yearly cleaning costs have been reduced by 30 to 40% for many of America's office buildings, plants, hotels, hospitals and other institutions—and, at the same time, cleanliness standards have been raised.

ISC can set up a Work Standards System for you... custom designed to suit your building's particular needs. If you would like to know how this high productivity system of cleaning can save you money and raise your cleanliness standards, write for complete information today.

Monsanto Chemical Co. keeps its new World Headquarters Building cleaner at less cost with the ISC Work Standards System

Industrial sanitation counselors

2934 CLEVELAND BOULEVARD
LOUISVILLE 6, KENTUCKY

TO: ISC, 2934 Cleveland Blvd., Dept. F560
Louisville 6, Kentucky

☐ Send me the complete story on Monsanto's cleaning program

☐ Send me information about the ISC Work Standards System

Name_____ Title_____

Company_____

Address_____

City_____ State_____

For more facts Circle 971 on Reader Service Card

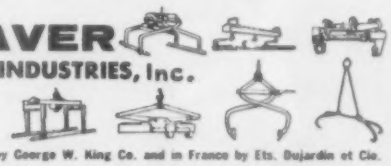
$25,000 and 2,800 Sq. Ft. of SPACE SAVED with a MANSAVER SHEET GRAB!

A large business machine manufacturer states that without the Mansaver they purchased, "we would have needed at least 2,300 to 2,800 *additional* square feet of floor space." This plant figures space at $10.00 per square foot; the space conserved by the Mansaver meant a dollar savings of approximately $25,000.00. The grab cost only $1,235.00.

Ask our District Representative into your plant to study your handling problem for personal recommendation or presentation for our solution.

MANSAVER INDUSTRIES, Inc.

3122 East St.,
New Haven, Conn.



Also Manufactured in England by George W. King Co. and in France by Ets. Bujardin et Cie.

For more facts Circle 972 on Reader Service Card

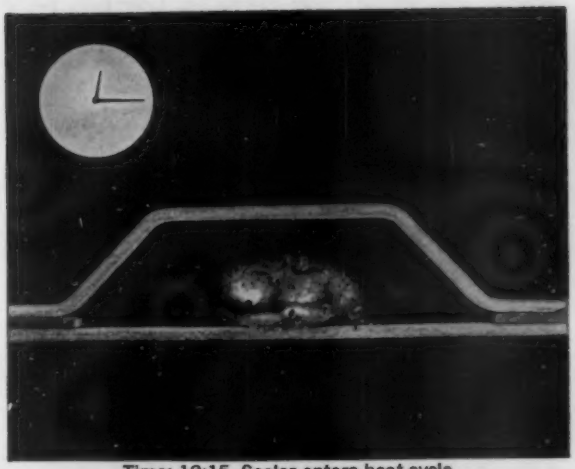
CUT YOUR LIGHTING COSTS TURN LIGHTS ON AT DUSK- OFF AT DAWN AUTOMATICALLY!

There are over 250,000 Precision Photo Controls regulating yard, platform & other outdoor lights, producing artificial light only when necessary.

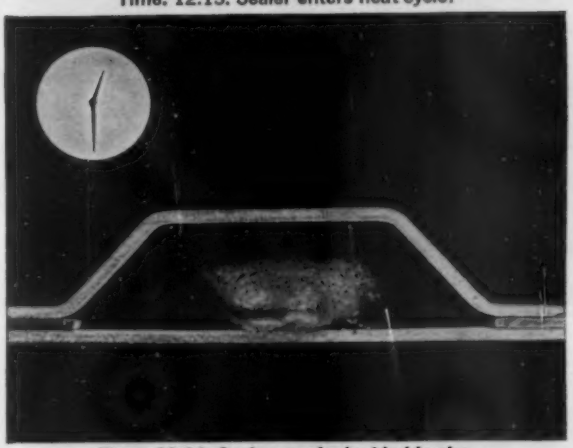
PRECISION MULTIPLE CONTROLS., RIDGEWOOD, N. J.

For more facts Circle 973 on Reader Service Card

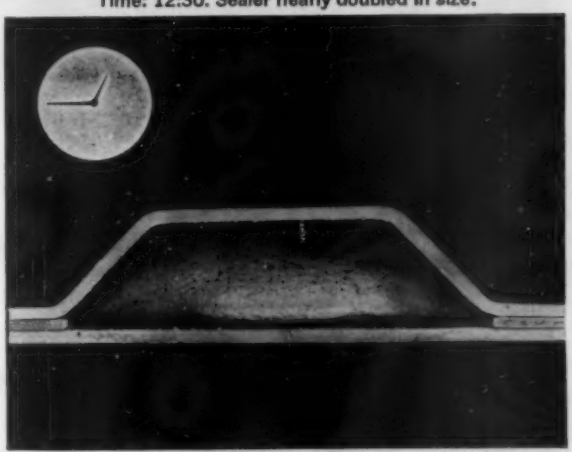
Positive way to seal irregular gaps and seams—3M Heat Expandable Sealers



Time: 12:15. Sealer enters heat cycle.



Time: 12:30. Sealer nearly doubled in size.



12:45. Sealer nearly fills cavity. Time elapsed: ½ hour.

You can simplify tough sealing jobs of irregular gaps and seams with 3M Heat Expandable Sealer EC-2117. When heated this liquid will expand 150% in volume and cure to a solid sponge rubber material to tightly fit the shape of the seam, affording a weather-tight, water-tight, dirt-tight seal.

EC-2117 is designed to expand and cure to a resilient sponge-like rubber which will adhere to most surfaces. It can also function as a weld-thru sealer which does not alter normal spot welding procedure, nor interfere with weld quality. EC-2117 adheres well to both clean and oily surfaces. Use it wherever irregular openings must be filled, or where seam width is not constant.

Let 3M Adhesives, Coatings and Sealers help speed your production, improve product quality. For free information, write on your company letterhead to: AC&S Division, 3M Company, Dept. SBFF-50, St. Paul 6, Minnesota.

ADHESIVES, COATINGS AND SEALERS DIVISION

MINNESOTA MINING AND MANUFACTURING COMPANY

...WHERE RESEARCH IS THE KEY TO TOMORROW

3M COMPANY

HOW PAGEMASTER® BY STROMBERG-CARLSON KEEPS PRODUCTION HIGH, DOWNTIME LOW

WHERE'S THE PRODUCTION ENGINEER . . . THE MAINTENANCE CHIEF . . . THE PLANT ELECTRICIAN?

Key men like these don't stay in one spot long. But you can't afford to waste time looking for them when a machine is down or a production line is halted.

You can find them in seconds with a Pagemaster® selective wireless paging system by Stromberg-Carlson—wherever they are in the plant.

Pagemaster paging is positive, instantaneous, completely selective. Each holder of a transistorized pocket-size receiver has his own private call signal. When he's wanted, *his* receiver—no other—alerts him with a tone signal. He picks up the nearest telephone and reports.

A Pagemaster system gives you the fast, sure way to reach the men you need to keep production at a maximum, downtime at a minimum.

Systems are available for *lease or purchase* . . . can be expanded to meet growing needs. For complete data, write to Commercial Products Division, 1402-05 North Goodman Street, Rochester 3, New York.

"There is nothing finer than a Stromberg-Carlson"

WITH PAGEMASTER YOU REACH THE PEOPLE YOU NEED WHEREVER THEY ARE IN THE PLANT OR OFFICE.

STROMBERG-CARLSON

A DIVISION OF **GENERAL DYNAMICS CORPORATION**

For more facts Circle 975 on Reader Service Card

REALITY IN AUTOMATION

Fork trucks that automatically stack, retrieve and transport... tractor trains without drivers... automated overhead handling equipment... push-button, robot-like machines to do your bidding—

THIS IS THE POWER ONE MAN CONTROLS WHEN HE PUSHES THE BARRETT BUTTON...

the power you can have in your plant. Applications almost limitless.

Interesting? Call, write or wire Barrett to investigate... or return coupon.

PLANTRONICS DIVISION

BARRETT

616 Dundee Road • Northbrook, Illinois

BARRETT-CRAVENS COMPANY

Representatives in All Principal Cities

Please send me information about Barrett automated systems.

Name.....Title.....

Company.....

Street.....

City.....Zone.....State.....

All-purpose liquid detergent

Mop it on...

Cindet

Let Cindet suds lift the dirt for you

CINDET does a cleaner job—cuts labor costs: Mop it on, walk away, come back and pick it up.

CINDET does the job with no drag because dirt particles shatter, lift and ride high.

CINDET does more cleaning with less effort and less material; works in hard or soft water.

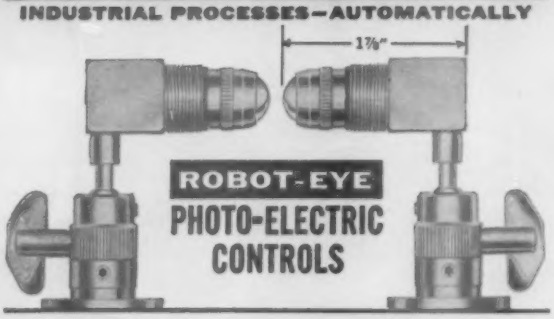
CINDET outstrips them all as a wax stripper. Cleans walls, woodwork, tile, porcelain, glass, metal.

For free sanitary survey of your premises ask your Dolge Service Man

dependable
DOLGE
WESTPORT, CONNECTICUT

count, inspect, control

INDUSTRIAL PROCESSES—AUTOMATICALLY



Transistorized and Tube **AMPLIFIERS**

Plug-in relays, receptacles for plug-in connection of lamps and cells. Additional Plug-in accessories include counters and time delays.

MINIATURIZED
Small, for "tight-spot" installation, yet rugged for long service. Accurate, for precise automatic control in virtually any industry.

INTER-CONNECTING
Plug-in terminals available for quick connection to any of a wide range of Amplifiers. This design enables you to select the most economical amplifier for your job requirements.

INEXPENSIVE
Standard Set P-5 is $17. Set P-5S is $21. Amplifiers start at $39.50. For complete data, write for Brochure NP-5

standard INSTRUMENT CORPORATION
657 BROADWAY, NEW YORK 12, N.Y.

For more facts Circle 978 on Reader Service Card

From the World's largest Manufacturers of
COMMERCIAL & INDUSTRIAL INCINERATORS

FREE JOSEPH GODER Waste Disposal SURVEY OF YOUR PLANT

- complete destruction of waste
- no-smoke, no-odor air pollution control
- important dollar savings in operation
- small, medium or large factory, there's a Joseph Goder Incinerator to handle every waste disposal problem better.

Joseph Goder Incinerator specialists will survey and check your waste disposal methods and/or installation. They may uncover hidden losses in equipment or in messy, wasteful scavenger service, needed minor repairs or recommend standard replacements of outmoded incinerators.

Write for Catalog or See the Yellow Pages for name of nearest Joseph Goder Representative.

JOSEPH GODER INCINERATORS
4235 N. HONORE ST. • CHICAGO 13, ILL.

Find Your Nearest Agent In The Yellow Pages

For more facts Circle 977 on Reader Service Card

For more facts Circle 979 on Reader Service Card

outer space is NOT our specialty

This power operated Monorail crane with electric hoist provides for simplified storing and immediate accessibility of every coil.

WE EXPLORE INNER SPACE

—and we do something about it!

American Monorail Engineers can show you how you can convert lost ceiling space into efficient avenues of overhead handling. With a Monorail system your floor space is safer, less cluttered and you gain additional work area. Monorail systems also make it possible to process work in motion, reduce idle time and worker fatigue.

Write for Free Booklet with 56 pages, 99 photos.

ENGINEERED MATERIALS HANDLING

1114 EAST 200th STREET CLEVELAND 17, OHIO

AMERICAN MONORAIL © A.M.Co. 1960

DIVISIONS: Conveyor Division, Tipp City, Ohio – Canadian Monorail Co., Ltd., Galt, Ont.

IDEA! "Our wash fountain area is safer now with 'SCOTCH-TRED'!"
IDEA! "Our cloth cutting-room floors aren't slippery now. 'SCOTCH-TRED' gives a comfortable, safe footing!"

Everybody's talking about "SCOTCH-TRED"... the new IDEA material for greater efficiency, safety and protection!

Amazing new "SCOTCH-TRED"—the *resilient* non-slip surfacing material—is carpet quiet . . . tile tough! Pleasant textured surface is durable, long-wearing; brings new comfort and beauty to safety-conditioning. Easily cleaned with soap or water.

Soft . . . pliable . . . easily applied! "SCOTCH-TRED" comes in 9" squares and in 96-foot rolls in any width up to 36". It is easily cut with shears or knife. Strong pressure-sensitive adhesive sticks at a touch.

FOR EXTRA HEAVY-DUTY NEEDS, "SAFETY-WALK" is often used —a mineral-coated fabric that is practically indestructible.

Complete information and prompt service available from local wholesalers. Consult your nearest 3M branch office—today.

scotch•tred
BRAND
Resilient NON-SLIP SURFACING

"SCOTCH-TRED" and "SAFETY-WALK" are made in U.S.A. by Minnesota Mining & Mfg. Co., St. Paul 6, Minn. Export: 99 Park Ave., New York 16. Canada: London, Ontario.

MINNESOTA MINING AND MANUFACTURING COMPANY
...WHERE RESEARCH IS THE KEY TO TOMORROW
3M COMPANY

CLIP and MAIL for FREE SAMPLE

3M COMPANY, Dept. AAF-50
St. Paul 6, Minn.

☐ Rush free sample of "SCOTCH TRED".
☐ Send sample and information on "SAFETY-WALK".

Name_____
Firm_____
Address_____
City_____ Zone____ State_____

438 For more facts Circle 981 on Reader Service Card

...be heard there!

Place phones where you need them — with Acousti-Booths, noises won't interfere with conversations. Noises are absorbed before they can interfere with hearing and speech.

There is a model suitable for every location. And as always — the *acoustical performance is guaranteed.*

For model descriptions and prices, write for Bulletin No. A142-4T.

BURGESS-MANNING COMPANY
Architectural Products Division
749 East Park, Libertyville, Ill.

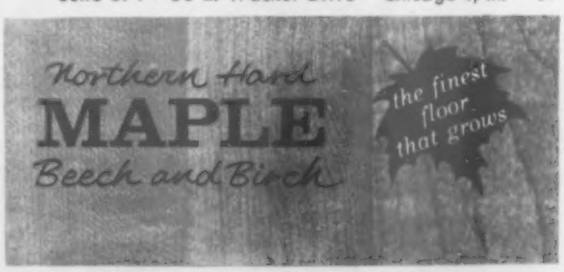
For more facts Circle 982 on Reader Service Card

tough—*and beautiful!*

The *beauty* of MFMA Northern Hard Maple floors doesn't cost you a dime. You get *more* of every *other* floor value than any synthetic can deliver. You get the brawny strength Maple adds to a structure—its lifelong ability to fight traffic wear—low-cost upkeep—easy refinishing ("always a new floor underneath"). Workers like its foot-friendly comfort. Its brightness stimulates quality work standards. A tool dropped on Maple is rarely harmed. All this makes its unique beauty a *pure bonus,* for new work or modernizing.

For bright, modern style / *See Sweet's Arch. 13J-Ma or write —* / *For lifetime endurance*

MAPLE FLOORING MANUFACTURERS ASSOCIATION
Suite 571 • 35 E. Wacker Drive • Chicago 1, Ill. 64



For more facts Circle 983 on Reader Service Card

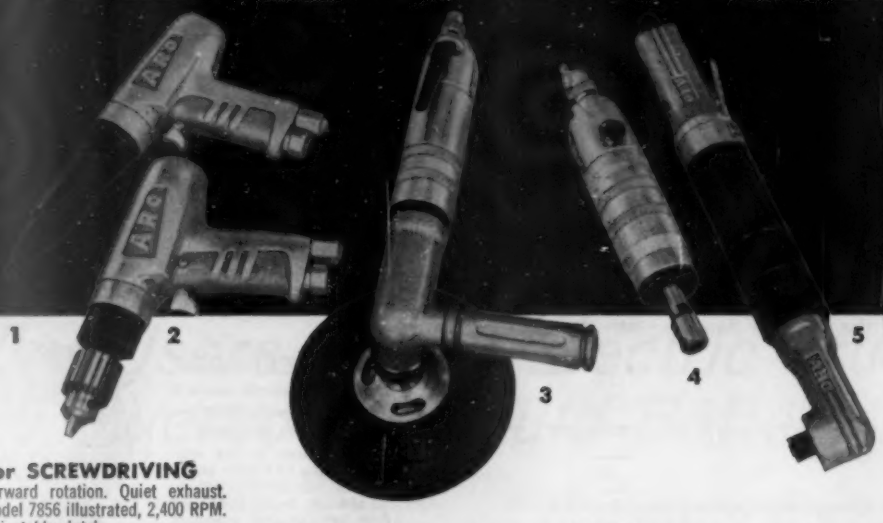
Another New **ARO** Air Motor Produces

SUPER POWER

...brings you

SUPER PERFORMANCE

in new **ARO** "2200 Series" **TOOLS!**



1 For SCREWDRIVING
Forward rotation. Quiet exhaust. Model 7856 illustrated, 2,400 RPM. Adjustable clutch.

2 For DRILLING
Big power in compact size! Quiet exhaust. Model 7846 illustrated, 2,400 RPM.

3 For SANDING
Right-angle sander. Quiet exhaust. Model 7944 illustrated, 3,500 RPM. Polishers also available.

4 For GRINDING
Short grinder, aluminum housing. Quiet exhaust. Model 7872 illustrated, 18,000 RPM.

5 For NUTSETTING
Heavy-Duty, Right-Angle. Direct Drive. Model 7825 illustrated, 800 RPM.

Mighty—and eager to prove it! This great new series of ARO super-powered tools gives you more brute power per pound! More speed to slash costs on a wide range of assembly jobs. Greater safety, too—no shock or spark hazard.

Every tool is precision-built, and is more easily adaptable to your specific application. Your ARO Distributor invites you to job-test these new cost-saving tools *now* without obligation!

ARO

®AIR TOOLS
Also Air Hoists . . . Automotive Tools
THE ARO EQUIPMENT CORPORATION
Bryan, Ohio
Aro of California, 3141 S. Grand Ave., Los Angeles 7, Calif.
Aro Equipment of Canada Ltd., Rexdale (Toronto), Ontario.
Offices in All Principal Cities

For more facts Circle 984 on Reader Service Card

LARGE ATOMIC PLANT USES TUBAR DUMPERS TO LIFT AND DUMP DRUMS OF CHEMICALS

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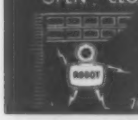

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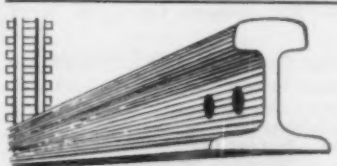

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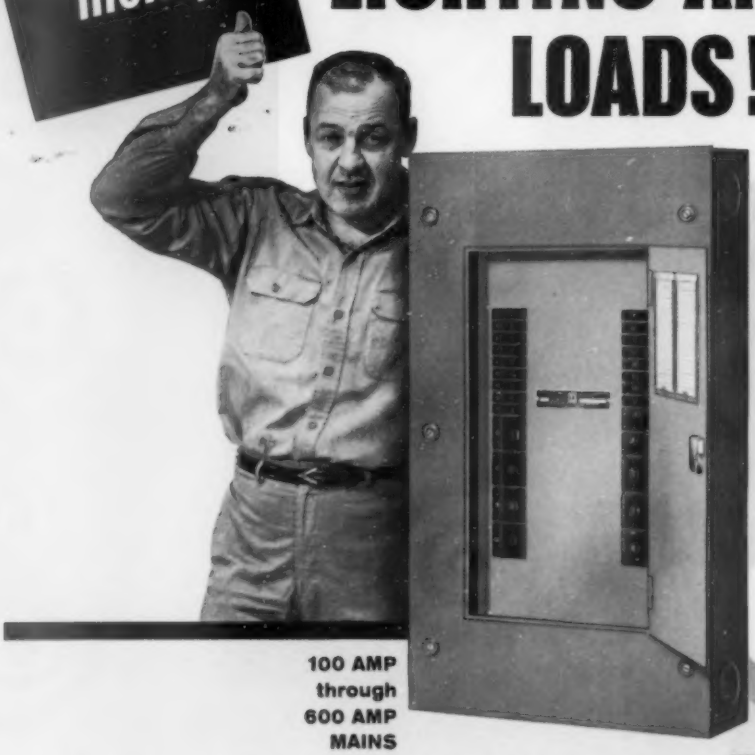

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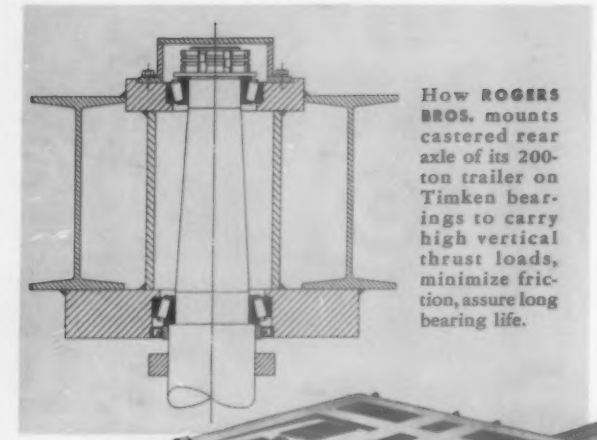

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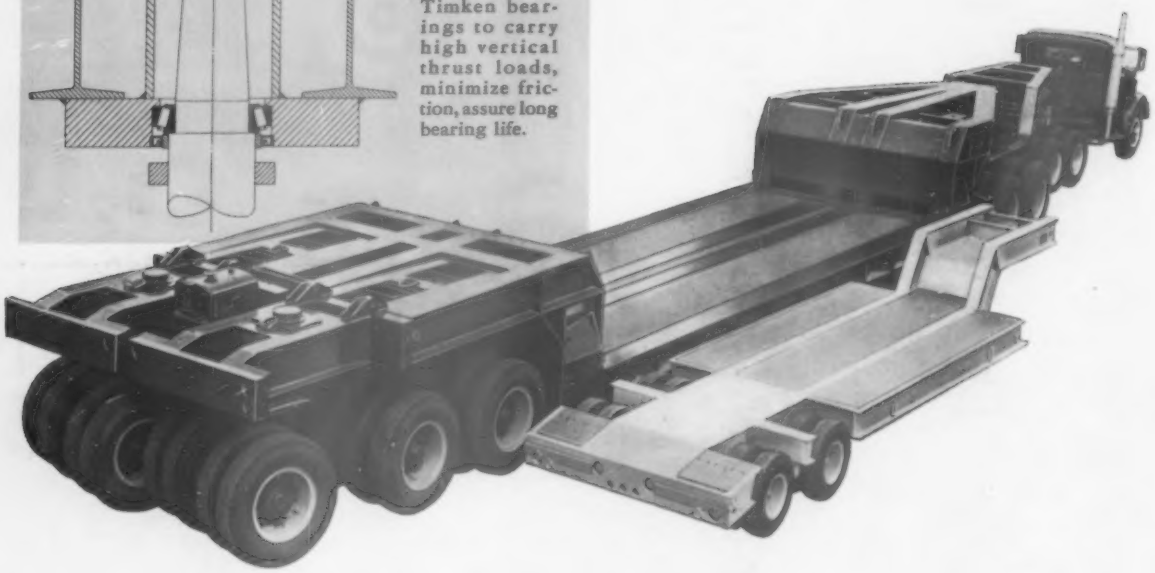

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